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## Vocational training for female job returners: Effects on employment, earnings and job quality

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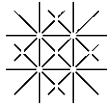
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# Vocational Training for Female Job Returners - Effects on Employment, Earnings and Job Quality\*

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January 6, 2022

## Abstract

This paper studies how training vouchers increase the employment prospects of women with interrupted employment histories. Using the population of female job returners who receive a training voucher to participate in training programs and a randomly selected control group from German administrative data, I analyze the effectiveness of training on various labor market outcomes. The results suggest that receiving a training voucher translates into substantial gains in employment and earnings and increases job quality and stability. Analyzing the heterogeneity effects reveals that the effectiveness of training increases with the provided human capital. Several robustness checks support a causal interpretation of the results.

JEL-Classification: J68, H43, C21

Keywords: Job Return, Active Labor Market Policies, Treatment Effects, Program Evaluation, Training Voucher, Return to work

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# 1 Introduction

A growing body of literature shows that family-related employment interruptions negatively affect the subsequent careers of women. After interruption periods, women experience negative employment and wage effects (see, for example, Drange and Rege, 2013, Evertsson, 2016, Beblo et al., 2009), lower occupational mobility (see, for example, Evertsson et al., 2016, Evertsson and Grunow, 2012) and a reduced probability of receiving job-related training (Puhani and Sonderhof, 2011). Recent studies show that interruption periods also contribute to the gender gap in wages and income (see, for example, Kleven et al. 2019a, Angelov et al., 2016, Goldin, 2014). Kleven et al. (2019b) estimate the child penalty defined as a percentage of women falling behind men after childbirth in different countries. They report a significant short- and long-run penalty in earnings for all countries; however, for Germany, they report the largest penalty of 61%.

Policies to address these earnings penalties focus mainly on instruments influencing the length of employment interruptions after giving birth (for a recent survey, see, Cortés and Pan, 2020). This focus is reflected in the economic literature that investigates the impact of parental leave and job protection legislation on mothers return behavior and their employment outcomes (most recently, e.g., Kluve and Schmitz, 2018, Schönberg and Ludsteck, 2014, Lalive et al., 2014, Lalive and Zweimüller, 2009). In a recent study in Germany, Kluve and Schmitz (2018) document that a reform of the parental benefit system that introduced very generous but temporally limited benefit payments that could be divided between parents changed women’s interruption behavior and positively affected their employment rates and job quality after return. However, women career patterns remain characterized by interruption periods and episodes of part-time work that increase the gender wage gap over the employment life cycle (Schrenker and Zucco, 2020).

Little is known about the effectiveness of policies to re-integrate women once they decide to withdraw from the labor market for shorter or longer durations. In this paper, I investigate the impact of publicly funded vocational training for women in Germany who intend to re-enter the labor market after family-related interruptions. Hence, my study contributes to understanding the effectiveness of a policy instrument that could alleviate gender penalties in wages and employment when the interruption period has already occurred. Women can return to the labor market in different ways. I focus on the subset of re-entrants that register at a local employment agency in Germany to use the services provided by the public employment service (PES). Re-entrants with a family-related interruption period of at least 12 months are defined as “job returners” and are eligible for placement services and active labor market policies (ALMP). Therefore, German legislation recognizes the relevance of the successful re-integration of returning women.

Vocational training programs are expected to improve the labor market prospects of job returners for various reasons. First, they provide occupation-specific knowledge and job-related skills to participants, and the certificates are an important signaling device for potential employers. Second, the attendance of such courses is an opportunity to meet women in similar situations and to build networks that have been found to positively affect labor market opportunities (e.g., Calvo-Armengol and Jackson, 2004). Especially after long interruption periods, these programs may provide a first chance to make contact with potential co-workers. Third, program participation may serve as an exercise in managing work and family life with respect to time constraints and childcare facilities.

In Germany, publicly funded vocational training is assigned through training vouchers. A challenge in this study is that the assignment of these vouchers is likely endogenous. Responsible caseworkers in the agency decide whether to award the voucher and are likely to base their assignment decision on women’s job-finding probability after participation. To identify the causal effects of being awarded a training voucher, I apply a matching strategy to account for selection based on observable characteristics. I perform an analysis using the population of female job returners who receive a training voucher from 2003-2005 and a random sample of non-treated job returners from German administrative data. These data contain daily records of the pre- and post-interruption periods as well as a large set of characteristics including the employment histories of the women before their labor market exit. Conditional on these determinants, I argue that the job returners are randomly awarded a training voucher. Many robustness checks support the identifying assumptions and justify a causal interpretation of the findings.

My findings suggest that vocational training programs could alleviate gender penalties in wages and employment when the interruption period has already occurred. Awarding a training voucher translates into a 12 percentage point (ppoint) higher probability of employment and higher monthly earnings of 210 Euros/250 US dollar (USD) six years after treatment. This effect is remarkable if examined in relation to the women’s average pre-interruption earnings. Specifically, a training voucher reduces the difference between pre- and post-interruption earnings by approximately 77%. Additionally, job quality and stability increase. Job returners who receive training vouchers have a significant higher probability of working full-time and receiving at least their previous earnings. Moreover, the probability of experiencing unstable marginal employment decreases permanently, and treated job returners are more often employed in stable jobs.

Analyzing effect heterogeneity in terms of job returners’ qualification and their participation in different program types reveals interesting insights. I find a training voucher to be most effective for job returners without a vocational degree. However, it also contributes to the successful re-integration of medium-skilled women with a vocational degree. For the highest skilled job returners with academic degrees, awarding a training

voucher is ineffective. The results strongly implicate that the effects of training vouchers work through the human capital channel. A decomposition of the overall effect by the redemption decision reveals a zero effect for unredeemed training vouchers. Conditional on voucher redemption, the effectiveness of training increases with the intensity of human capital provided in the different program types.

My paper relates to several fields in the literature. It is the first study to estimate the impacts of vocational training for female job returners on their subsequent labor market outcomes. Thus, it adds to the literature evaluating active labor market programs focusing on women (for an overview, see, Bergemann and van den Berg, 2008) and especially to the rare literature that focuses on programs targeting women after family-related employment interruptions (see, Diener et al., 2013, Bergemann and van den Berg, 2014). In contrast to these studies, I focus on a sample of women that have a manifested return idea. Moreover, none of the programs evaluated in these studies are comparable to vocational training programs in terms of content or intensity. Bergemann and van den Berg (2014) evaluate an adult education program for young, low-skilled mothers with small children in Sweden. The program provides general skills to low-educated mothers to improve their employability. The findings suggest positive effects on wage and employment rates; however, enrollment is low. In recent years, the German Federal Employment Agency initiated a modular program targeting women considering a return. The modules consist of informative events, short training measures and intensive counseling. Diener et al. (2013) report significant positive effects on the probability of working full-time for women who finish all the modules.

This paper also relates to the large body of literature concerning the effectiveness of vocational training for unemployed individuals in Germany, other EU countries (e.g., Doerr et al., 2017, Lechner et al., 2011) and the US (e.g., Andersson et al., 2013, Heinrich et al., 2013). A detailed overview of the effectiveness of these programs is provided by McCall et al. (2016). By definition, these studies exclude the population of job returners because they restrict their evaluation samples to individuals entering unemployment directly out of employment. Observations of job returners who enter unemployment out of inactivity are not considered. However, the study by Doerr et al. (2017) is most closely related to this paper. They study the effectiveness of training vouchers in Germany for the same period and with the same data for the regular unemployed. The authors report significant positive effects on employment probability and wages that are much lower in size than the effects presented here. For regular unemployed, they find small employment effects of two percentage points and no effect on monthly earnings. They find no significant differences by gender. The effectiveness of vocational training is much higher for job returners than for regular unemployed women.

More broadly, this study also relates to the literature that focuses on the effects of

parental leave and benefit policies on interruption durations and female labor market outcomes. Kluve and Schmitz (2018), Schönberg and Ludsteck (2014), Lalive et al. (2014), Dahl et al. (2016) for example, investigate such policies in European countries and, e.g., Rossin-Slater et al. (2013), Baker et al. (2008) do so in the US and Canada. In contrast, this paper focuses on how an active labor market policy, namely, the opportunity to receive vocational training, affects the employment situation of women after family-related employment interruptions that last beyond the usual maternal leave period.

The remainder of this study is structured as follows. The background information and a description of the institutional setting follow in Section 2. The data description and sample definitions are presented in Section 3. I discuss the empirical strategy and show descriptive statistics in Section 4. Finally, I present and discuss the empirical results with regard to the different outcomes and effect heterogeneity. The final section concludes.

## 2 Institutional background

### 2.1 Definition of a job returner

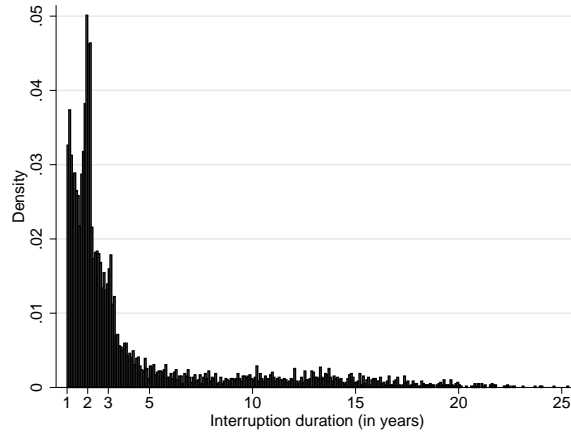
Women have several options when they re-enter the labor market after a family-related withdrawal from the labor force in Germany. Re-entrants who interrupted a regular employment relationship could, in principle, return to their former employer if the interruption had a maximum duration of three years.<sup>1</sup> Re-entrants for which this is not an option could either search for a job by themselves or use the services of the PES. In this study, I focus exclusively on women belonging to the latter category. The PES categorizes these re-entrants as job returners (in German: *Berufsrückkehrer*).<sup>2</sup> Job returners (according to §20 German Social Code (SGB) III) are defined as women (or men) who have interrupted employment, unemployment or an apprenticeship for at least 12 months to care for their children (younger than 15 years) or other family members and who show the intention to become employed in the near future.<sup>3</sup> Figure 1 displays the distribution

<sup>1</sup>Maternity allowance is paid in Germany within a period of 6 weeks before and 8 weeks after giving birth. In that time, mothers are not allowed to work. During the time considered in this study, the income-independent childcare payment (*Bundeserziehungsgeldgesetz*) was paid up to two years after giving birth and was independent of the mothers' employment state. This instrument was replaced by the *Elterngeld* in 2007, which is paid for 12 months only, is income-dependent, and can be split between couples.

<sup>2</sup>The wording "job returner" is somewhat imprecise since the women do not necessarily return to a job. However, to be defined as a job returner, they must show a serious intention to start working within the near future. Furthermore, the PES uses this terminology. Therefore, I use "re-entrants to the labor market" and "job returners" interchangeably throughout the text.

<sup>3</sup>Since 98% of job returners are women, I focus on female job returners only. No information is available regarding the reason for the family-related interruption. In a survey conducted by Diener et al. 2013, 78% of surveyed women gave the upbringing of their own children as the reason for the interruption, 8% had to care for relatives, and some women gave both reasons. Other reasons that were mentioned were marriage and participation in a family business.

Figure 1: Distribution of interruption duration



Note: Each bar represents one month. The abscissa is labeled in years. The minimum interruption duration according to the formal definition for job returners is 12 months. The maximum duration observed in the data is 304 months (25 years).

of the interruption duration of job returners analyzed in this study. The distribution is clearly skewed to the right. Approximately 65% of job returners re-enter the labor market within a period of three years.

To use the services offered by the PES, re-entrants must register at a local employment agency for one of three types of registration: (1) seeking advice, (2) searching for employment, or (3) unemployed. These registration types are the same for all individuals that register at the PES and are not tailored to the group of re-entrants. The status definition narrows from registration state (1) to (3), and the number of available services and benefits increases. Whereas registration state (1), seeking advice (in German: *ratsuchend*), allows the re-entrant to use information and counseling services only, individuals who also want to use the placement services must at least register as (2), searching for employment (in German: *arbeitsuchend*).<sup>4</sup> Finally, registration (3), unemployed (in German: *arbeitslos*), is the requirement to obtain unemployment benefits and for unemployed individuals only. It opens the possibility of participating in ALMP programs and contributing to the pension system, but it also imposes obligations. Such registered individuals must actively search for employment for at least 15 hours a week, attend regular meetings with a caseworker and be available if caseworkers present a suitable job offer irrespective of whether they obtain unemployment benefits. An overview of the available services corresponding to each registration state is provided in Table A.1 in Appendix A.

The initial registration of re-entrants likely depends on their eligibility to receive unemployment benefits. They could be eligible to receive benefits if they were regu-

<sup>4</sup>Individuals registered in states (1) or (2) could be employed or unemployed. State (1) allows individuals with a more diffuse job search intention to register and receive an initial counselling service only. State (2), searching for employment, would be optimal for the unemployed who do not receive benefits or the employed searching for a new job because they wish to switch firms or are at risk of losing their jobs.



larly employed directly before the interruption because entitlements obtained from pre-interruption employment persist in the case of family-related interruptions until the child turns three years old. If a job returner is eligible to receive unemployment benefits, she must register as being unemployed to receive them. Job returners who are ineligible for unemployment benefits may choose between the three registration states. Two-thirds of the job returners investigated in this paper registered as being unemployed upon their return. The other job returners registered as searching for employment. No job returner was registered as seeking advice only. Ebach and Franzke (2014) investigate the motivations behind the registration behavior of job returners. The authors find that job returners switch between states and report that the registration in the pension system and the opportunity to participate in ALMP programs are the driving forces of an unemployment registration even when registrants do not receive benefits. Because the registration status determines the services that can be accessed and is crucial to the identification strategy, I discuss it in further detail in Section 4.1.

## 2.2 Vocational training

Vocational training is an important part of ALMP in Germany and the most important instrument among the policies focusing on qualification. During the years 2003-2005, the German government spent more than 10 billion Euros for vocational training. These programs aim to increase the human capital of the participants by providing, maintaining and updating occupation-specific skills. The obtained certificates may also serve as an important signaling device for potential employers. Therefore, such training appears to be particularly suitable for increasing the re-employability of job returners. In fact, vocational training was offered to 4.2% of all job returners who registered in the years 2003-2005. This fact makes it the most frequently offered instrument among the policies targeted to job returners.<sup>5</sup> Job returners are also more often assigned to vocational training than regular unemployed women, of whom only 2.7% were assigned.

The provision of vocational training by local employment offices is organized through a voucher system.<sup>6</sup> Once the re-entering women register at a local employment office and receive a consultation, the caseworker may decide that vocational training is the appropriate program for improving her employability. If the woman agrees and is not yet registered as unemployed, she may switch her registration state to become eligible to participate in ALMP programs. Then, the woman is awarded a voucher enabling her to participate in a training program. The caseworker notes the educational objective,

<sup>5</sup>2.3% of all registered job returners were offered a slot in short training and application measures, and 1.8% received targeted wage subsidies during the time period under consideration.

<sup>6</sup>The voucher system was introduced in January 2003. Previously, the provision of vocational training functioned through a direct assignment system by caseworkers. The reform of the provision of vocational training and the institutional changes are discussed in Doerr et al. (2017).

Table 1: Vocational training programs for job returners

Program type	Average planned duration	Share	Description	Examples
Practice firm training	164 days	13%	Courses that took place in practice firms to simulate a work environment.	Training for commercial software, office clerks, data processing
Short training	127 days	37%	Provision of occupation specific skills (duration $\leq 6$ months).	Training courses as medical assistant, office clerk, draftsman, hairdresser, lawyer
Long training	285 days	23%	Provision of occupation specific skills (duration $> 6$ months).	Training as tax accountant, elderly care nurse, office clerk, physical therapist
Retraining	833 days	26%	Courses to obtain a first/new vocational degree.	Apprenticeship as elderly care nurse, physical therapist, hotel and catering assistant
Others	-	1%	e.g. courses for career improvement	

Note: I use the categorization of programs proposed by Lechner et al. (2011) and analyze the information on the training voucher with regard to the training content. The presented examples refer to training goals that are often listed on the training voucher. The category “others” contains different types of training programs with very few participants.

maximum program duration and validity on the voucher.<sup>7</sup> The job returner may choose a program offered by a certified training provider subject to the restrictions noted on the voucher. Although a training voucher is awarded at the caseworker’s discretion, its redemption cannot be controlled. The voucher redemption rate during the observation period is 90%.

Training programs differ with respect to content and duration. Following Lechner et al. (2011), I distinguish among practice firm training, classical vocational training and retraining. Practice firm training programs are relatively short and simulate a work environment in a practice firm. The educational aims of these programs are to update the skills of job returners mainly in commercial software programs and MS Office applications. Classical training programs provide occupation-specific skills and occur mainly in classrooms. I differentiate between short (maximum duration of 6 months) and long (duration over 6 months) training programs. Typical examples of classical vocational training programs for job returners include programs for office clerks, craftsmen, and medical assistants to update knowledge and skills according to recent developments. Retraining programs have a long duration of up to three years.<sup>8</sup> These programs lead to a (new) vocational degree within the German apprenticeship system and cover the full curriculum of vocational training for occupations such as an elderly care nurse or physical therapist. These programs may be particularly relevant for re-entrants with former occupations for which there is low demand at return.

<sup>7</sup>In addition, information regarding funding and the commuting zone and various other information is included. For a detailed description of the voucher system, see Doerr et al. (2017) or Rinne et al. (2013).

<sup>8</sup>Only the first two years are funded by local employment agencies. Other programs sponsored by the state government may cover the additional costs of the third year.

## 3 Data and sample

### 3.1 Data description

This analysis is based on administrative data on training vouchers provided by the German Federal Employment Agency. The sample contains information of all individuals in Germany who received a training voucher between 2003 and 2005 and includes the exact award and redemption dates for each voucher. To enrich this voucher data, they are merged with the individual data records from the Integrated Employment Biographies (IEB) for each voucher recipient.<sup>9</sup> The sample of control persons originates from the IEB and is drawn as a 3% random sample of individuals who did not receive a training voucher between 2003 and 2005. I account for the fact that I use a 100% sample of voucher recipients and a 3% random control sample with different sampling probabilities in all calculations.

I restrict the treated and control samples to women who register at local employment offices between January 2003 and December 2004 and are categorized as job returners. The reason is that I focus on voucher awards to job returners within the first year after their registration, and my observation period of the voucher data covers only the period until December 2005. The sample of job returners excludes women who return to their former employers or search for employment by themselves. Additionally, women who are self-employed or civil servants are excluded in the data. Omitting these subgroups is not problematic since I aim to estimate the effects of receiving a training voucher. Because eligibility for a voucher depends on registration at local employment agencies, those who do not register are not relevant for the effect estimates of interest in this study. I do not restrict the sample based on employment status before the interruption. This method is justified by the formal definition of a job returner that also includes women who interrupted from unemployment or apprenticeship. Nevertheless, I restrict the sample to women who are 25-49 years at the time of registration.

This study focuses on women deciding to return to work in a period of high unemployment, but for Germany in the decade between 1995 and 2005, not particularly high. The period examined can be considered a prolonged recession period after the end of the new economy boom in the early 2000s. The unemployment rate reached its maximum in

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<sup>9</sup>The IEB is a rich administrative database and source of the subsamples of the data used in all recent studies evaluating the programs of German ALMP (e.g., Biewen et al., 2014, Lechner, Miquel, and Wunsch, 2011, Lechner and Wunsch, 2013, among others). The IEB is a merged data file containing individual data records collected in four administrative processes: the IAB Employment History (*Beschäftigten-Historik*), the IAB Benefit Recipient History (*Leistungsempfänger-Historik*), the Data on Job Search originating from the Applicants Pool Database (*Bewerberangebot*), and the Participants-in-Measures Data (*Maßnahme-Teilnehmer-Gesamtdatenbank*). IAB (*Institut für Arbeitsmarkt- und Berufsforschung*) is an abbreviation for the research department of the German Federal Employment Agency.

2005. As a response to the increasing unemployment rate, the German labor market was intensively reformed in this time period, particularly in 2005. This situation is not problematic for the empirical analysis because the comparison groups were equally affected by the Hartz reforms. Depending on the length of the training program, most job returners that received a training voucher might have finished training in 2004 or 2005 when the economy already started to recover, or, for those who participated in the longer programs between 2006 and 2007, they might have finished when the unemployment rate was falling and the economy was strongly growing. Therefore, the labor market situation was not exceptional but was rather good when participants finished training. The same holds for the comparison group.

### **3.2 Treatment definition and evaluation approach**

Using these data, I can observe not only the exact start date of the training program but also the exact date when the voucher was awarded, thus, when the assignment to the program occurred. The treatment of interest in this study is the award of a training voucher within the first year after registration at the local employment agency. Using this treatment definition, I estimate the effect of being awarded a voucher (not the effect of participating in a training program). The voucher assignment is a dynamic process, and caseworkers can assign training vouchers anytime during the unemployment period as long as the job returners are registered as unemployed. One practical aspect that has received considerable attention in the evaluation literature is how to address the timing of the treatment relative to the elapsed duration since return. Whether a dynamic or a static concept is used is an important decision because the treatment and control groups are defined based on the choice of evaluation framework.

Dynamic evaluation approaches explicitly consider the timing of the treatment (see, Lechner, 2009, Sianesi, 2004, among others). Sianesi (2004) propose to estimate treatment effects conditional on the time elapsed since unemployment, here, since return. By implementing this concept, I would estimate the effect of receiving a training voucher in the current month versus not receiving it in the current month but possibly receiving it later. One major concern of dynamic evaluation approaches is raised by Lechner et al. (2011). They argue that the composition of the control sample changes for each month elapsed since return, a fact that hinders the interpretation of the results. Furthermore, a dynamic approach demands a large amount of data. Because job returners constitute a relatively small group (the share of job returners among all voucher recipients is approximately 9%), I am faced with restrictions regarding the number of observations in my sample, although it consists of the population of the job returners that received a training voucher in the years under consideration.

Therefore, I use a classical static evaluation approach and compare the job returners

who received a training voucher within the first 12 months of return to those who did not. This approach can lead to underestimating the results because such a constructed control group may consist of individuals who do not receive treatment because they already found a job, thereby representing a positive selection of the non-treated with better labor market characteristics than those in the treatment group (see discussion in Frederiksson and Johansson, 2008).<sup>10</sup> To overcome this concern, I randomly assign pseudo treatment start dates to each individual in the control group by recovering the distribution of the time elapsed since return from the treatment group (similar to, e.g., Lechner, 1999, Lechner and Smith, 2007, Huber et al., 2018, Doerr and Strittmatter, 2021, Knaus et al., 2018). To make the treatment definitions comparable between the treatment and control samples, I consider only job returners who remain unemployed at the start of their (pseudo) treatment. I use this constructed duration as a control variable in all estimations to partially capture the timing dimension. I present an extensive sensitivity analysis in which I use different evaluation samples and control group definitions in Appendix.

### 3.3 Outcomes

I use various outcomes to measure the effectiveness of awarding training vouchers to job returners. The two standard outcome measures in the literature are non-subsidized non-marginal employment (henceforth, employment) and monthly earnings. I count a job returner as employed if I have data for non-subsidized and non-marginal employment of at least 31 days. Earnings are calculated as real gross earnings per month. When considering job returners, I find it particularly interesting to determine whether vocational training alters job quality and employment stability. Therefore, I consider the probabilities of being employed full-time, earning at least 100% of the previous earnings (average of inflation-adjusted earnings in the year prior to the interruption), and being marginally employed as additional outcome measures of job quality.<sup>11</sup> I use the probability of finding a job that lasts at least 36 months to evaluate the effects on employment stability.

The award of a training voucher represents the intention to invest in human capital that involves direct and indirect costs. The direct costs of the programs are not observed in the data. Nevertheless, I measure the indirect costs from earning and employment losses during the participation period. Following Lechner et al. (2011), I use the accumulated

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<sup>10</sup>This argument derives from the observation that in countries such as Germany, nearly all unemployed persons would receive a treatment if their unemployment periods were sufficiently long. Accordingly, individuals who find jobs rapidly are less likely to receive training, as the treatment definition is restricted to unemployment periods. However, this argument is not applicable to job returners. They register at local employment agencies to receive counseling and advice for returning to work (often without receiving benefits). Those who do not receive a voucher do not necessarily represent a positive selection.

<sup>11</sup>Marginal employment (*so-called geringfügige Beschäftigung*) is an employment relationship with maximum monthly earnings of 450 Euros for which no social security contributions or taxes are paid. This category represents mostly jobs with a low number of hours and low qualification requirements.

employment and earnings as additional outcome measures to assess the effectiveness of vocational training for the job returners in terms of net benefits over the long term. I follow all individuals over a period of more than six years (76 months), which allows me to estimate short-, medium-, and long-term effects.

### 3.4 Sample description

In total, the main evaluation sample consists of 6,447 job returners, of whom 2,986 received a training voucher (treatment group) and 3,461 received another or no program in the first year after registration as a job returner (control group). I report the means of the characteristics of the treated and non-treated job returners in columns (1) and (2) of Table 2 and Table C.1 in Appendix C. These tables also show the standardized differences before and after matching in columns (3) and (5). To facilitate the presentation of the vast set of available variables, Table 2 includes variables with standardized differences larger than 20 before matching, and Table C.1 includes variables with smaller standardized differences. Information regarding individual characteristics refers to the time of return and registration as a job returner at a local employment agency. Information regarding former employment refers to the last job before interruption. Only the characteristics of the local employment agency districts refer to the (pseudo) treatment time.

Compared to control individuals, the training voucher recipients are older and are more likely to be married. Furthermore, they more often have children younger than six years but are less likely to have children younger than three years. These returners have finished school more often with a university entry degree and are less likely to have no vocational education. The voucher recipients were more often employed in occupations related to business accounting and law. The share of re-entrants who had previously worked full-time is higher in the control group, but individuals in the treatment group were more often employed in a white-collar job. The duration of the employment interruption differs considerably between the treated and non-treated women. The training voucher recipients had an average interruption duration of 72 months (more than 6 years). This duration among the non-treated women is considerably briefer (28 months), which is reflected in their eligibility to receive unemployment benefits. Only 17% of the job returners who received a training voucher are eligible, whereas the share is 41% in the control group. The share of the women who returned in 2003 and the first quarter of 2004 is larger in the treatment group. Regarding the labor market history, I find that the voucher recipients were employed longer, had higher wages and received fewer benefits. These returners are more likely to reside in West Germany and local employment agency districts with a lower unemployment rate and a higher share of full-time vacancies.

Table 2: Mean values of observed characteristics with large standardized differences

	(1) Treatment- group	(2) Control- group	(3) SD between (1) and (2)	(4) Matched Control group	(5) SD between (1) and (4)
<b>Personal and family characteristics</b>					
Age in years	36.237	33.900	39.524	35.539	11.898
Age 25-29 years	0.163	0.270	26.178	0.167	1.143
Age 40-44 years	0.241	0.140	26.120	0.188	13.102
Married	0.687	0.571	24.161	0.620	13.991
Children 3-5 yrs	0.256	0.171	20.818	0.302	8.211
Children $\leq 3$ yrs	0.235	0.483	53.475	0.285	11.416
<b>Educational and vocational degrees</b>					
University entry degree	0.236	0.141	24.410	0.219	3.971
No vocational degree	0.171	0.255	20.526	0.194	6.032
<b>Last occupation</b>					
Business accounting and law	0.402	0.256	31.466	0.351	10.551
Working time: Missing	0.276	0.161	28.139	0.242	7.704
White-collar	0.647	0.447	40.933	0.599	9.960
Blue-collar	0.217	0.359	31.671	0.252	8.071
<b>Interruption and return characteristics</b>					
Interruption duration (months)	72.369	28.432	90.324	54.274	29.949
Eligible for unemployment benefits	0.166	0.409	55.833	0.224	14.660
Status prior interruption					
Employed	0.464	0.271	40.844	0.503	7.771
Unemployed	0.521	0.723	42.565	0.481	8.092
Return 3th quarter 2004	0.110	0.180	20.177	0.150	12.057
Return 4th quarter 2004	0.081	0.196	33.740	0.097	5.767
<b>Labor market history</b>					
Months employed last 1 years	3.510	1.838	39.927	3.374	2.916
Months employed last 3 years	11.801	7.270	39.801	11.317	3.859
Months employed last 6 years	25.672	16.678	41.400	25.080	2.461
Months unemployed last 1 years	2.725	5.349	57.587	3.085	8.219
Months unemployed last 3 years	4.978	11.383	72.003	5.618	7.952
Months unemployed last 6 years	6.362	16.055	75.946	7.310	8.781
Months with benefits last 3 years	5.482	8.767	39.135	5.088	5.230
Months with benefits last 6 years	7.986	13.501	43.853	7.212	7.215
Cumulated wages last 3 years (Euros)	19,329	10,714	40.473	17,575	7.198
Cumulated wages last 6 years (Euros)	46,336	25,831	46.608	44,179	4.225
Cumulated benefits last 3 years (Euros)	3,508	5,961	43.988	3,429	1.523
Cumulated benefits last 6 years (Euros)	5,238	8,743	41.740	4,678	7.630
<b>Regional characteristics</b>					
Bavaria	0.211	0.127	22.482	0.203	1.986
Hamburg, Schleswig-Holstein, Mecklenburg Pomerania	0.042	0.096	21.490	0.051	4.313
Northrhine-Westphalia	0.217	0.136	21.326	0.204	3.388
Saxony-Anhalt, Saxony, Thuringia	0.107	0.267	41.979	0.132	7.709
West Germany	0.781	0.529	55.131	0.754	6.583
Share of employed agriculture	0.011	0.017	50.289	0.012	12.505
Share of employed construction	0.062	0.070	39.929	0.063	4.246
Share of employed trade	0.150	0.144	32.962	0.149	3.955
Share of employed banking, insurance	0.039	0.033	41.665	0.038	7.440
Share of employed public service	0.064	0.071	37.242	0.065	7.421
Share of employed education	0.039	0.047	46.775	0.040	6.032
Share of employed private households	0.001	0.001	50.700	0.001	4.346
Share of vacancies: full-time	0.786	0.751	31.514	0.780	5.814
Unemployment rate	11.792	14.770	52.041	12.160	6.893
N	2,986	3,461		3,461	

Note: In columns (1) and (2), the mean values of observed characteristics for the treated and non-treated sub-samples are reported. Column (4) shows the mean values of the matched control group. Information on individual characteristics refers to the time of registration as job returner in local employment agencies, with the exception of the monthly regional labor market characteristics which refer to the (pseudo) treatment time. I report the standardized differences (SD) between the samples before and after matching multiplied by 100. The variables included in the estimations are listed in Table 3.

## 4 Empirical strategy

### 4.1 Identification

Randomized trials are the gold standard for determining causality. However, randomization rarely occurs when public policies are implemented, and training vouchers are not randomly assigned to job returners. One strategy to address selectivity in treatment is to rely on a selection-on-observables identification, which is motivated by the richness of the data used in this study.<sup>12</sup> To identify the treatment effect of interest, which is the effect of awarding a training voucher to job returners in the first year after their registration, I control for pretreatment variables  $X$  that jointly influence the treatment assignment and the outcome. Then, conditional on these variables, the voucher assignment and the potential outcomes of job returners are independent. This condition is established as the conditional mean independence assumption (CIA). Furthermore, the identification requires overlap in the distributions of the propensity scores between the treated and control samples (see the discussion in Lechner and Strittmatter, 2019). The formalization of the treatment effect and the identifying assumptions are shown in Appendix B.

In the following, I argue that the CIA is satisfied in the case of assigning training vouchers to job returners. Doing so requires that I can control for all factors that jointly determine the award of a training voucher and the potential outcomes in the estimations. The voucher assignment is determined by the eligibility of the job returners to receive a voucher, the assignment decision of caseworkers, and re-entrants' motivation to return.

The eligibility for a training voucher depends on job returners' registration status. Only registration as unemployed renders them eligible to receive a voucher, which may induce a bias if the job returners select different registration states. Ebach and Franzke (2014) conducted a case study with caseworkers and job returners. The authors observe many switches among the states and report that registered job returners are often not informed about the differences between registration states. In this sample, the share of job returners who register as unemployed directly after return amounts to 64% and 68% in the control and treatment group, respectively. Additionally, I observe up to four switches between registration states in both groups. I control for possible selection from the registration process by including information on the registration status directly after return and eligibility for unemployment benefits in the estimations. Benefit-eligible job returners likely register as unemployed for mainly monetary reasons rather than the possibility of participating in training.

Job returners differ in their education, occupational background, pre-interruption at-

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<sup>12</sup>Another way to address selection in treatment is to use a strong and convincing instrument that generates random variation. Such an instrument is unavailable in this setting.



tachment to the labor market and family situation. All these factors are observable to the caseworker and play a role in the decision to assign a training voucher. Table 3 summarizes the potential confounders, their availability in the data, and how they are included in the estimation. I condition on variables that describe the job returners' personal, educational and vocational background in all estimations. Furthermore, I control for their employment histories and their employment status directly before interruption. The probability of receiving a training voucher also depends on regional labor market conditions. Caseworkers must consider local labor demand in their assignment decisions. Therefore, I include detailed regional information and condition on state dummies and the share of the employed in the production industry per local employment district.

Table 3: Overview of potential confounders and available and used control variables

Potential confounders	Information available in the data	Control variables included in the estimation
Return process	Daily spell information, registration states for each spell	Elapsed duration until treatment, dummies for registration as unemployed directly after return, eligibility for unemployment benefits, quarter dummies of return
Personal characteristics	Age, nationality, health problems, family status, number of children (living in the household), birth dates of the youngest child, Missing: partner information	Dummy for health problems, dummy for being married, dummy if child is between 1-3 year old, dummy if child is between 3-5 year old
Educational background	Educational degrees, vocational degrees	Dummies for educational degree at return, dummy for no vocational degree
Former occupation	Occupational classification (FEA 2010), working time, working position	Dummies if last reported occupations was in business, accounting or law, dummy if last occupation was white-collar work, dummy if last occupation was full-time
Employment history	Employment spells, unemployment spells, spells with benefit receipt, daily wage	Dummy for being unemployed directly before return, months unemployed the last 6 years before interruption, cumulated wages and benefits in the last 6 years before interruption
Regional characteristics	Regional identifiers, number of employed per industry, unemployment rate, population density, number of vacant full-time jobs	State dummies, share of employed in production industry per local employment district
Attitude/Motivation	—	Interruption duration in months

Note: Because of the sample size and potential multi-correlation, I did not include all variable that are available in the data in the estimations. I followed Huber et al. (2015) and used omitted variable test to select the variables with the largest explanatory power. In the descriptive statistics, I show that also the omitted variables are balanced after matching.

The group of registered job returners is quite homogeneous with respect to their motivation to return. The reason for this consistency is that registration as a job returner produces obligations (e.g., attend regular meetings with a caseworker and be available for job offers), but, in contrast to regular unemployed persons, job returners are mostly ineligible to receive benefits. In this sample, only 25% of the job returners receive benefits after registration. Therefore, I expect that selection based on motivation is less severe compared to that in studies focusing on regular unemployed individuals. Despite the homogeneity with regard to their motivation to return, the job returners might differ considerably in factors that are not directly observable in the data, such as their abilities,

toughness, attitudes toward employment or situation with a partner and family. These factors influence the duration of a woman’s employment interruption and the expected benefits of training. I account for them by conditioning on the interruption duration as an additional control variable.

Past studies have assessed the CIA in the context of the evaluation of policy programs in the US (e.g., Heckman et al., 1999, Mueser et al., 2007) and Germany (e.g., Biewen et al., 2014, Lechner and Wunsch, 2013) and support its plausibility in cases of flexible conditioning on the labor market history, personal characteristics, and regional labor market information. These studies focus on the plausibility of the CIA with respect to participation in a certain program. In this study, the treatment of interest is the award of a training voucher within the first year after registration at a local employment agency. Using this treatment definition, I estimate the effect of the intention to participate in training (being awarded a voucher). I argue that the selection process used to identify this effect is less demanding because starting the program is not part of the selection. Thus, the CIA need not hold for the selection process of voucher redemption.

## 4.2 Estimation

I apply radius matching on the propensity score with bias adjustment as proposed by Lechner et al. (2011). Thus, I compare the outcomes of job returners who are similar with respect to their probability of being treated conditional on all observed characteristics but that differ only in terms of receiving a voucher.<sup>13</sup> To reduce the bias that may result from incorrectly specifying the propensity score model, I match on a Mahalanobis distance specified by selected control variables in addition to the propensity score (see discussion in Lechner et al., 2011, Huber et al., 2014). All variables included in the propensity score and added as control variables in the Mahalanobis distance are listed in Table 3. The inference is based on the standard errors of the estimated parameters obtained by nonparametric bootstrapping (sampling individual observations with replacement) with 499 replications.

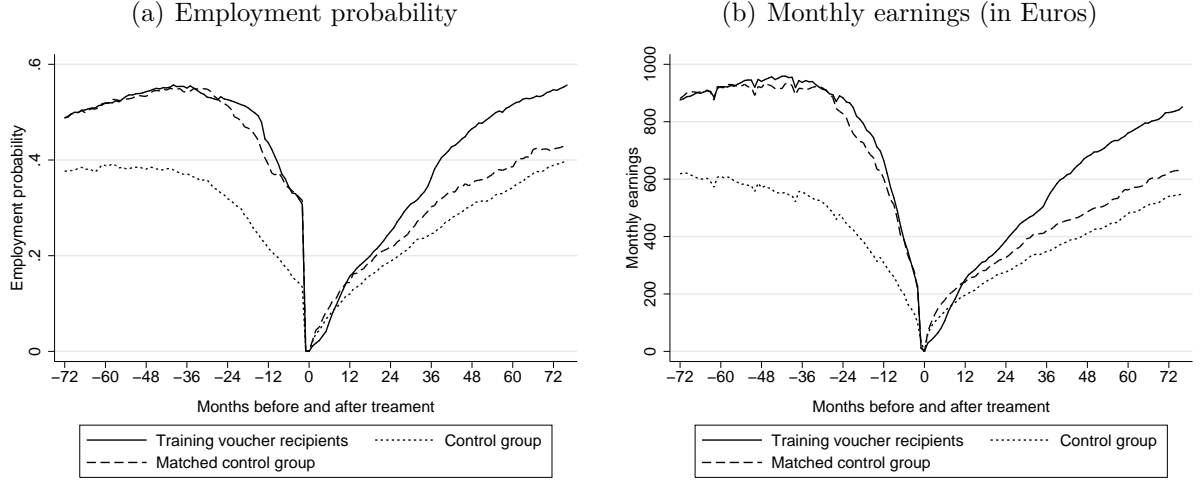
## 4.3 Balancing

The balancing of the characteristics of the treated and non-treated job returners before and after matching is shown in Table 2 and Table C.1 in Appendix C. In column (3) of

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<sup>13</sup>Radius matching uses a one-to-many matching algorithm that matches each treated unit to control units located at a predefined distance around its propensity score (Dehejia and Wahba, 1999, 2002). Radius matching is found to perform well in an empirical Monte Carlo simulation study conducted by Huber et al. (2013), highlighting its good performance relative to linear regressions, especially in evaluation studies that rely on small samples.

Figure 2: Outcome levels of comparison groups for the pre-interruption and post-treatment period



Note: The levels of employment and earnings are presented for each of the 72 months before the interruption and the 76 months following the treatment (148 months).

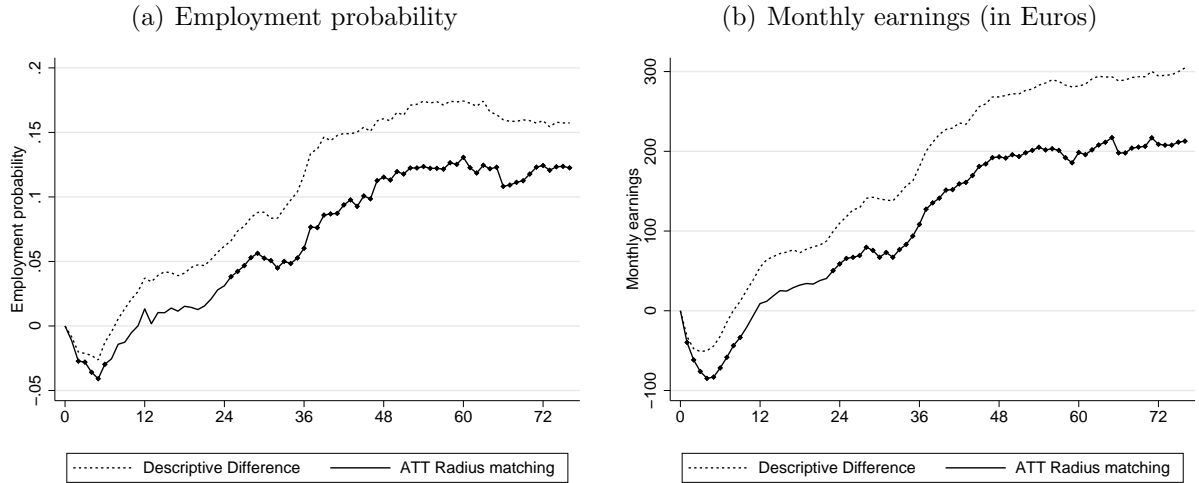
these tables, I report the standardized difference in the mean values before matching.<sup>14</sup> I report the mean values of the covariates for the matched control group in column (4) and the standardized differences after matching in column (5). The standardized differences decrease remarkably after matching in both the included and the omitted variables (see Table 3). According to Austin (2011), there is no universally agreed-upon criterion to indicate important imbalances. However, studies refer to a benchmark of 10 to indicate negligible differences between treatment groups (e.g., Normand et al., 2001). As reported in column (5) of Table 2 and Table C.1 in the Appendix, the standardized differences after matching are, in most cases, smaller than 10, or, if higher, very close to 10.<sup>15</sup> I interpret this finding as an indicator of high match quality.

The high match quality is confirmed when I investigate the average employment and earnings levels in the treated, control and matched control groups separately over the pre-interruption and post-treatment time horizons in Figure 2. I find a large difference in the employment and earnings levels of the treated and control samples before interruption. Among the treated job returners, the employment rates range between 50-60%, and the earnings range between approximately 900-1000 Euros per month. The employment and

<sup>14</sup>For each covariate  $j$ , I calculate the standardized difference as  $SD_j = 100 \times (\bar{x}_{1j} - \bar{x}_{0j}) / \sqrt{0.5(s_{x_{1j}}^2 + s_{x_{0j}}^2)}$ , where  $\bar{x}_{1j}$  and  $\bar{x}_{0j}$  are the sample means of the  $j$ -th covariate in the treated and control group, respectively, and  $s_{x_{1j}}^2$  and  $s_{x_{0j}}^2$  are the corresponding sample variances.

<sup>15</sup>The only exception is the interruption duration in months. For this characteristic, the standardized difference before matching is higher than 90 and reduces remarkably after matching to a value of 30. To check if this trend drives the empirical results, I implemented a subgroup analysis by the interruption duration (interrupted 12-24 month, 24-36 months, or more than 36 months). I find no noteworthy difference between these subgroups. The results are available upon request.

Figure 3: ATT on employment and earnings



Note: Effects are estimated for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5%-level. Significance levels are bootstrapped with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

earnings rates in the control group are lower, confirming the positive selection of the treated samples with respect to employment and benefit histories. The differences between the two groups nearly disappear after matching. Overall, these levels appear reasonable because I do not restrict the sample to those who are employed before the interruption. The definition of job returners also includes those who have interrupted unemployment or apprenticeship.

## 5 Empirical results

### 5.1 Employment and earnings effects

The effects on the probability of being employed and monthly earnings are presented in Figure 3. The lines show the point estimates for each month and diamonds indicate significant effects at the 5%-level. The dashed line indicates the unconditional difference between the treatment and control groups. The solid line displays the average treatment effect on the treated (ATT) obtained by radius matching with a bias adjustment for each month after the voucher receipt.

I find negative lock-in effects over the short term because the training participants reduce their search activity during participation, which reduces both the probability of being employed and the monthly earnings compared to the control persons. The length of the lock-in effects corresponds to the average program duration of 12 months. After two years, the point estimates become significantly positive. After four years, the job returners who received a training voucher have a 12 pp point higher probability of being employed

than had they not received the voucher. The employment effect remains constant until the end of the observation period. The long-term effects on monthly earnings amount to 200 Euros (220 USD) per month. These effects are large compared to the effect estimates of 2-3 ppoints for employment and zero earnings gains found with the vouchers awarded to regular unemployed persons during the same period (comp. Doerr et al., 2017).

Higher employment and earnings levels may emerge in the long term from the high indirect costs due to short-term foregone employment and earnings during lock-in periods. As shown in Figure 3, the positive effects on both outcomes stabilize after approximately 48 months, indicating a positive long-term equilibrium. This result implies that the success of vocational training net the lock-in effect will always be positive. To quantitatively assess the net benefit at the end of the observation period, I accumulate the employment months and earnings over more than six years. I show the results in Table D.1 in the Appendix. The net benefit starts to be positive and significantly different from zero after four years. Compared to the first month after treatment, the training voucher recipients are employed more than five months longer and earn 8,360 Euro (10,000 USD) more than comparable non-recipients after 76 months. Assuming that the treatment effect remains constant beyond the observational period, the net benefits are likely to be large at the end of job returners' working life.

The results of an extensive sensitivity analysis, in which I applied different evaluation approaches, are presented in Figure E.1 in Appendix E. The effect estimates obtained from the static approaches differ only slightly using different time windows and the (pseudo) elapsed duration as a control variable. The lock-in effect on the employment outcomes is somewhat less pronounced when I control for the (pseudo) elapsed duration than when using the pure static approaches. This result might indicate that I correct for the bias predicted by Frederiksson and Johansson (2008) by retaining individuals in the control sample only to the extent that they remain unemployed at the pseudo start of the treatment. In the long term, the pattern of all the static approaches is very similar. Using a dynamic approach, I find a different pattern, which hints at attenuation effects. These effects occur because the voucher recipients in the dynamic concept are compared with a control sample that had partially received a voucher to participate in training later. A detailed discussion can be found in Appendix E.

To further check the robustness of my results and support a causal interpretation, I perform several robustness checks. First, I show the results of an impact estimation of pretreatment (here, pre-interruption) outcomes. If there are unmeasured constant differences between the treated and control individuals, I would observe them in the effect estimates before interruption. Second, I implement two different placebo validations in the pre-interruption period to show that I condition on all the variables that are necessary to balance the employment outcomes of the treated and control samples. Third, another

robustness check is performed by estimating treatment effects for the job returners who do not redeem their training vouchers. If effects exist other than those I aim to measure (e.g., threat or anticipation effects), they should be discernible in the group of job returners with unredeemed training vouchers. The results of the robustness checks are presented in Section G and strongly support a causal interpretation of the results.

## 5.2 Job quality and stability

I aim to analyze if the receipt of a training voucher and potential subsequent participation in a training course affect the quality of employment obtained by the job returners. I use the probabilities of being employed full-time, earning at least 100% of the previous earnings, and being marginally employed. Marginal employment is also a good measure of employment stability because marginal employment tends to involve short-term contracts and no or reduced contributions to social systems. As a direct measure of job stability, I consider the probability of being employed in a job that lasts at least 36 months.

I find that the probability of being employed full-time significantly increases among the voucher recipients approximately two years after treatment (see Table 4). The point estimate after 76 months amounts to a 6.5 ppoint higher probability of full-time employment. Likewise, I find positive effects on the probability to earn at least as much as in the year before the interruption of 4-6 pppts. The accumulated effects on these job quality measures, presented in Table D.1, show that the voucher recipients are employed full-time more than three months longer than comparable job returners without training vouchers. Similarly, they are employed two months longer in jobs in which they earn at least their previous wage.

The outcomes of being full-time employed and employed with at least 100% of their previous earnings are coded as zero for non-employment and employment of another type. Hence, these measures of employment quality should be interpreted relative to the main employment effect.<sup>16</sup> If the main employment effect is 12 pppts and the effect on full-time employment is 6.5 pppts, approximately 55% of the employment gain is in terms of full-time employment, and 45% of the gain is in terms of part-time employment. Accordingly, 40% of the employment gain is from employment relationships in which job returners earn at least as much as before the interruption.

The positive effects on job quality are also confirmed when I consider the probability of being marginally employed. After a strong lock-in effect, the negative effect estimates on marginal employment stabilize 36 months after treatment at minus 4-6 pppts. Thus, the probability of marginal employment is permanently reduced for job returners who received

<sup>16</sup>This approach can avoid a double selection problem (e.g., Heckman, 1979, Lee, 1978, Sorensen, 1989). In a scenario in which I would interpret the employment quality measures conditional on finding employment, I would have to control for two selection processes: into treatment and into employment.

Table 4: ATT on job quality and job stability measures

	Months after treatment							
	6	12	24	36	48	60	72	76
Full-time employment	-0.018 (0.009)	0.011 (0.012)	0.030 (0.012)	0.047 (0.015)	0.074 (0.016)	0.085 (0.017)	0.066 (0.017)	0.065 (0.018)
At least 100% of previous earnings	-0.008 (0.008)	0.011 (0.010)	0.011 (0.013)	0.018 (0.016)	0.043 (0.017)	0.064 (0.017)	0.052 (0.018)	0.050 (0.018)
Marginal employment	-0.127 (0.024)	-0.105 (0.022)	-0.068 (0.017)	-0.051 (0.018)	-0.030 (0.016)	-0.047 (0.017)	-0.049 (0.019)	-0.061 (0.020)
Job lasts at least 36 months	-0.015 (0.010)	0.005 (0.013)	0.025 (0.017)	0.041 (0.019)	0.081 (0.022)	0.101 (0.023)	0.095 (0.022)	0.096 (0.022)

Note: Standard errors are obtained by bootstrapping with 499 replications.

a training voucher. The cumulative effects show that job returners with training vouchers were marginally employed for five fewer months than they would have been without a training voucher (see Table D.1). As outlined in Section 3.3, marginal employment can be characterized as precarious employment, especially if it is the only job and not a second job in addition to regular employment. In the unreported estimations, I check whether the effect is driven by a reduction in marginal employment as the main job or a reduction in the probability of having a marginal side job. I find that awarding training vouchers to female job returners has no effect on the probability that they engage in marginal employment as a side job. The entire effect is driven by a reduction in marginal employment as the main job.<sup>17</sup>

Finally, I present the job stability results in the last row of Table 4. The job returners with training vouchers benefit from a significantly higher probability of being employed for at least 36 months by approximately 10 ppoints. This effect is remarkable if interpreted relative to the main employment effect, which suggest that at the end of the observation period, nearly 80% of the employment gain is from stable employment relationships that last at least three years. Furthermore, the voucher recipients were employed nearly four months longer in such jobs (see Table D.1).

### 5.3 Heterogeneous effects by vocational degree

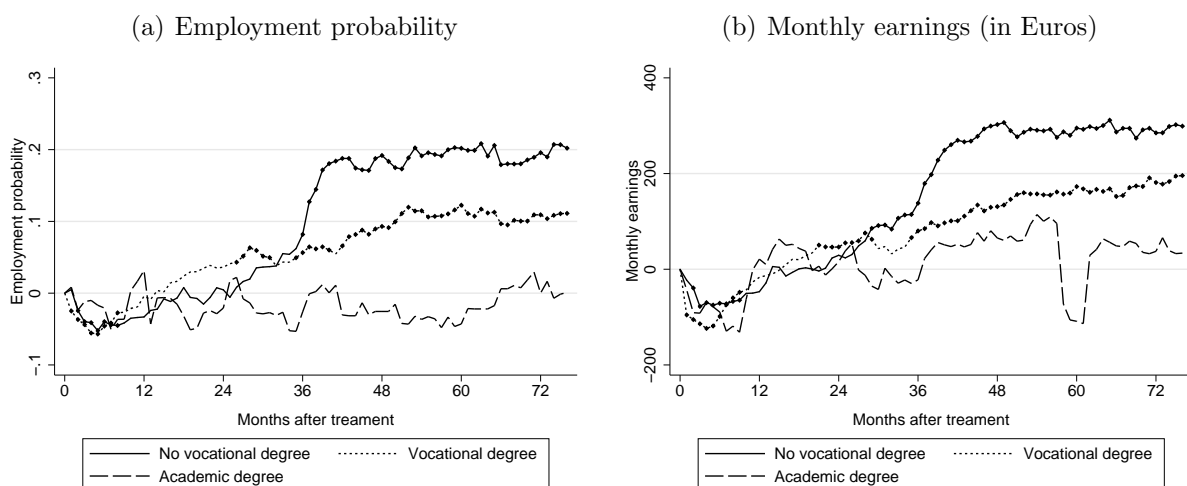
In this type of study, it is interesting to explore the effect heterogeneity in greater depth. First, I focus on differences among different qualified job returners. Second, I show how the effects vary by program type (see Section 5.4).<sup>18</sup> Previous studies that focus on training

<sup>17</sup>The results are available upon request.

<sup>18</sup>I implemented a heterogeneity analysis by the employment state of job returners directly before the interruption (employed, in apprenticeship, or unemployed) and by the interruption duration (interrupted 12-24 month, 24-36 months, or more than 36 months). Since I find no noteworthy differences and the effects for all subgroups follow the pattern of the main results, I did not include this analysis in the paper. Results are available upon request.

for regular unemployed persons find the largest effects for lower skilled participants (e.g., Doerr et al., 2017, Lechner et al., 2011). Since training programs provide occupation-specific skills and sometimes even a vocational degree to participants, training vouchers could be especially beneficial for low-skilled job returners. Qualifications are measured by vocational degrees at return. I distinguish between job returners with and without vocational degrees and identify high-skilled job returners with academic degrees. I stratify the sample according to these dimensions and perform the estimations separately for each stratum. The heterogeneous effects by vocational qualification are presented in Figure 4.

Figure 4: ATT on employment and earnings by vocational degree



Note: Effects are estimated for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5%-level. Standard errors are obtained by bootstrapping with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

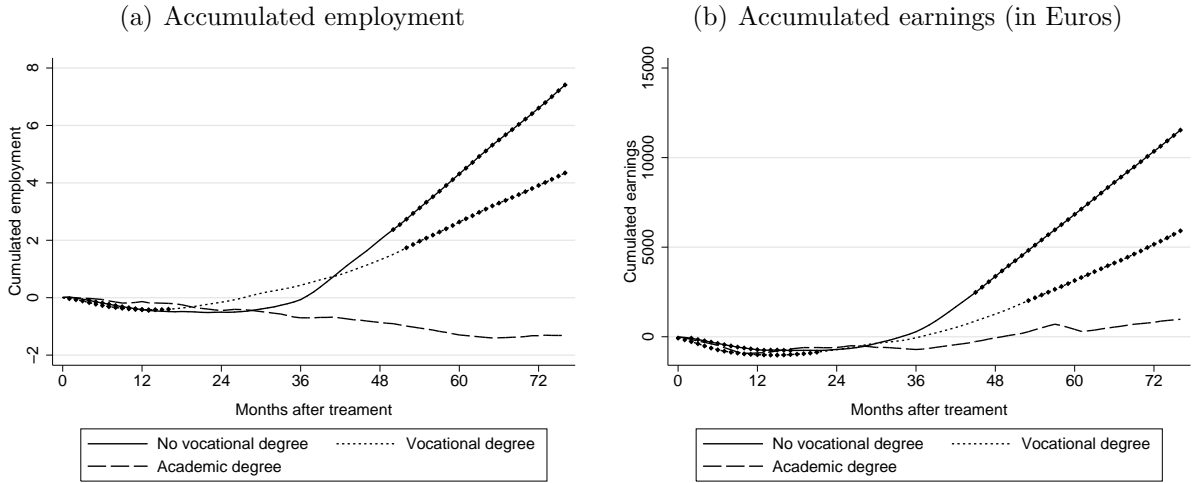
The highest effect is found for lowest-skilled job returners. I find some negative short-term effects, but after 36 months, the effect estimates are significantly positive on a high and stable level of 20 ppoints for employment. The pattern of monthly earnings is very similar. After 36 months, the effects amount to approximately 300 Euros (360 USD) and stabilizes until the end of the observation period. The pattern and effect size of the estimates for the medium-skilled job returners are very similar to the main effect. The medium-skilled job returners represent the largest skill group with 75% in the treated and 70% in the control sample. After two years, the effects become significantly positive and increase to a 12 ppoint higher employment probability in the long term. Earnings increase by nearly 210 Euros (250 USD). The accumulated effects show significant employment and earnings gains in both groups (see Figure 5). The net gains from being awarded a training voucher are higher for low-skilled job returners without vocational degrees than for the medium-skilled, although the cumulated effects for the low-skilled remain negative over a longer period. Over the 76 months considered in this study, treated job returners



without a vocational degree were employed more than seven months longer and earned 11,000 Euros more (13,000 USD) than had they not received the voucher.

The results of the highest-skilled job returners with academic degrees paint a more negative picture. I find no effects of a voucher award over the entire observation period on either employment or monthly earnings. Thus, awarding training vouchers to high-skilled job returners with academic degrees is ineffective. The accumulated effects on employment indicate employment losses, but these effects are not significant.

Figure 5: Cumulative employment and earnings by vocational degree.



Note: Accumulated effects are presented for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5%-level. Standard errors are obtained by bootstrapping with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

Overall, the finding that low-skilled job returners profit most from the voucher award confirms the results of Doerr et al. (2017). However, there are interesting differences between the results for regular unemployed and job returners. Doerr et al. (2017) find very strong and pronounced lock-in effects in all skill groups that are significantly more negative the higher the qualification of the unemployed is. This finding does not hold for job returners. Their lock-in effects vary somewhat in length, which derives from a different course type composition in the skill groups, but not in their depth, as job returners of all skill levels have a similar chance to find employment in the counterfactual situation of not being awarded a training voucher. This finding implies that even if a voucher award is ineffective in the long term, as is the case for high-skilled job returners, the net loss is not large. Another difference to the findings of Doerr et al. (2017) is the magnitude of the effects. The long-term effect of receiving a training voucher is zero for high-skilled regular unemployed and job returners alike, but the effects for medium- and low-skilled are much higher for job returners than for regular unemployed.

Heterogeneity by skill level and the remarkable positive effects for low-skilled job

returners could simply result from the composition of training types within the skill groups. In fact, nearly 50% of job returners without a vocational degree participate in retraining programs, whereas this share is only 20% and 14% among the medium- and high-skilled, respectively. In Table G.1 in the Appendix, I present a subgroup analysis by skill level and training program type. I find that the low- and medium-skilled job returners similarly benefit when they participate in short and long training programs. Focusing on retraining programs, I again find that the low-skilled job returners profit most. They outperform all other skill groups in terms of employment and earnings effects. Thus, the high positive effects for low-skilled job returners result not only from the course composition; they also seem to benefit most from training holding the program constant. This analysis reveals that awarding a training voucher to high-skilled job returners is ineffective irrespective of the program type.

#### 5.4 Heterogeneous effects by training type

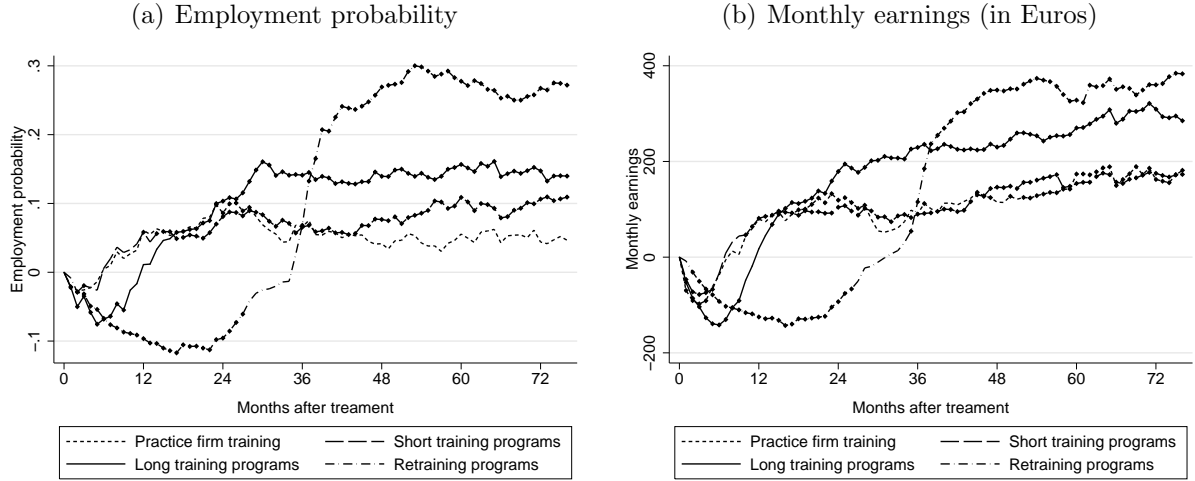
In this section, I estimate the effectiveness of the different program types conditional on voucher redemption (90% of all job returners redeem their training vouchers). The results by program type cannot be interpreted in a causal way because voucher redemption may include a particular selection. The results are nevertheless suggestive because they indicate the channel through which the causal effect operates.

The effect estimates clearly show that the success of the different program types increases with the human capital provided in these courses (comp. Figure 6). Furthermore, the pattern of the lock-in effects clearly corresponds to the length of the different program types. I find short negative lock-in effects for participants in practice firm training and short training over a period of six months. One year after treatment, the effects on employment and monthly earnings turn significantly positive. Whereas the earning effects evolve similarly for the two programs and result in a monthly increase of 180 Euros (220 USD) in the long term, the effects on employment diverge after 3.5 years. The long term employment effects of practice firm training are not significant. For short training courses, I find a significant employment increase that stabilizes at approximately 10 ppoints four years after treatment until the end of the observation period.

The long training programs provide occupation-specific knowledge and have a relatively long average duration of nine months. After a pronounced lock-in period, the employment and earnings effects become significantly positive 1.5 years after treatment. The effects on employment probability increase after two years to constant and significant 14 ppoints until the end of the observation period. The earnings effects show a similar pattern and increase from 220 Euros (260 USD) over the medium-term to 280 Euros (340 USD) six years after the training voucher is awarded.

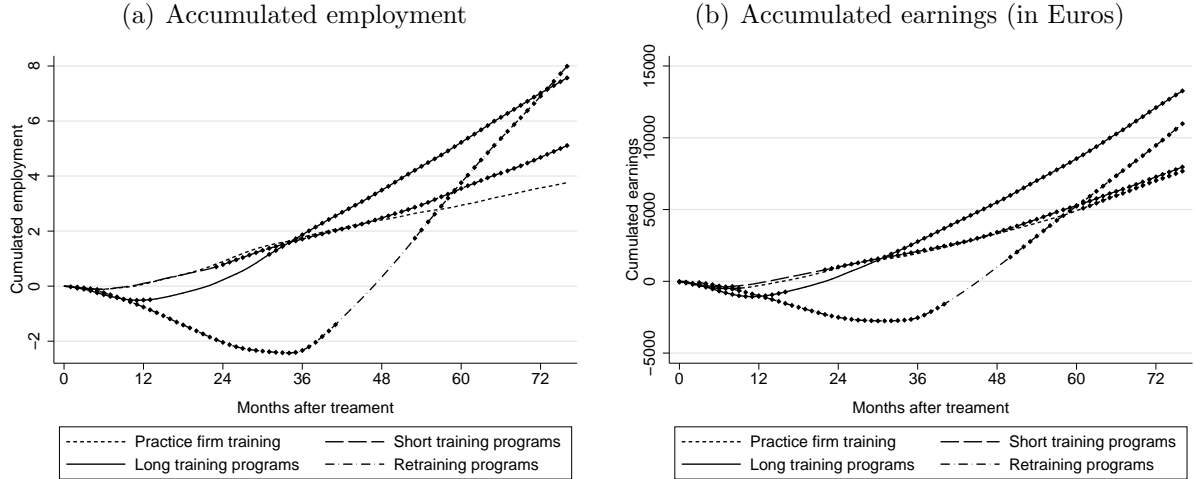
The retraining programs have the longest durations (up to three years). Participating

Figure 6: ATT on employment and earnings by course type



Note: Effects are estimated for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5 percent level. Standard errors are obtained by bootstrapping with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

Figure 7: Cumulative employment and earnings by course type.



Note: Accumulated effects are presented for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5%-level. Standard errors are obtained by bootstrapping with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

in such programs provide job returners the possibility to obtain a vocational degree. Therefore, unsurprisingly, I find much longer lock-in effects with this program type. The short-term employment probability is reduced by 11 ppnts, and earnings are decreased by 160 Euros (190 USD). After 36 months, the employment gain jumps rapidly, to over 25 ppnts, and the earnings gains are large, at over 370 Euros (450 USD) per month.

I present the results of cumulative employment and earnings in Figure 7. I do not find any effect on cumulative employment among job returners who participated in practice

firm training, but I find a significant gain in cumulative employment of five months with short training programs. The cumulative earning gains are similar for practice training and short programs and amount to 7,000 Euros (8,400 USD). Participants in long training programs and retraining gain approximately 8 months of employment until the end of the observation period. The slope of the cumulated effect is steeper for the retraining programs; thus, in the longer term, beyond the 76 months of observation, I expect the cumulative effects of retraining to become much larger than those of long training programs. Regarding cumulative earnings, I find earning gains of more than 13,000 Euros (15,500 USD) with the long training programs and gains of 11,000 Euros (13,000 USD) with the retraining programs. The participants in these programs benefit from higher employment and high monetary returns from their investment in human capital.

## 6 Conclusion

This paper is the first to investigate the impact of publicly funded vocational training for female job returners on their subsequent careers. It focuses on the case of Germany, where re-entrants to the labor market after a family-related interruption are eligible to participate in ALMP programs if they register at local employment agencies. Vocational training is the most prominent qualification instrument among ALMP programs available and is assigned through a training voucher. Using the rich administrative data of a 100% sample of job returners who are awarded a training voucher between 2003 to 2005 and a randomly generated control group, I identify the treatment effect of a training voucher award for the female job returners.

The findings show that training programs are very effective in improving the labor market outcomes of women after family-related withdrawal from the labor force. The award of a training voucher translates into a higher employment probability of 12 ppnts and higher monthly earnings (200 Euros/220 USD). Importantly, training vouchers also improve the quality and stability of the employment of the job returners. They face a higher probability of earning at least as much than before the interruption and obtaining a full-time job. In contrast, the probability of acquiring unstable marginal employment permanently decreases. Nearly 80% of the employment gain is from stable employment relationships. Several robustness checks support a causal interpretation of these results.

The investigation of the effect heterogeneity reveals interesting insight into vocational degrees and the effectiveness of different course types. Training vouchers are an effective instrument to improve the labor market outcomes for low- and medium-skilled re-entrants, and the highest positive effects are found for low-qualified job returners without a vocational degree. In contrast, awarding a voucher to job returners with an academic degree is ineffective. I find no effect of unredeemed training vouchers. Conditional on voucher

redemption, the effectiveness of training increases with the human capital intensity provided by the respective course. These results strongly imply that the positive effects of training vouchers work through the human capital channel.

The analysis in the paper focuses exclusively on the effect of publicly funded vocational training for the job returners who decided to register in local employment offices to receive a consultation and support in finding a job. On the one hand, based on the observed socio-economic characteristics of the registered job returners, those who received treatment seem to be positively selected compared to the non-treated women. Displacement effects could be an issue if some of the gains of the job returners who received a training voucher came at the expense of displacing the not treated or not-registered job returners. On the other hand, the treated job returners experienced longer interruption durations on average. When job returners with long interruptions are discriminated against by employers, displacement effects might be less of an issue. Unfortunately and similar to most program evaluation studies that use individual data at the micro level, it is impossible to analyze such general equilibrium effects.

The re-integration of women into the labor market after employment interruptions is of high economic importance, not only in light of recent skill shortages and the increasing demand for skilled labor but also because of its impact on the gender wage gap and the negative long-term consequences for women facing a remarkably higher risk of poverty at retirement if their working life is characterized by long interruptions. This study shows that vocational training helps the long-term labor market outcomes of female job returners who receive a training voucher. In particular, awarding a training voucher to low- and medium-skilled job returners contributes to the successful reintegration of these women. They benefit from a significant higher employment probability, higher earnings and higher job quality and stability, especially if they participate in programs that provide a substantial amount of human capital. In the period of consideration in this study, however, low- and middle-skilled job returners were less likely to receive a training voucher compared to high-skilled job returners: 3% of the lowest-skilled job returners and 4.3% of the middle-skilled job returners were assigned to vocational training. The share of high-skilled job returners who received a training voucher was 6.7%, nearly twice as high. Thus, although vocational training is the most frequently assigned ALMP instrument to job returners, its success could be significantly enhanced by offering more training to low- and middle-skilled job returners. For high-skilled women with an academic degree, other policy instruments should be considered.

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## A Institutional details

Table A.1: Services available in each registration state

Services	Seeking advice	Search for employment	Unemployed
<b>Information services</b>			
Material	✓	✓	✓
Events			
KURSNET, BERUFENET			
<b>Counseling services</b>			
Consultation (§29-30 SGB III)	✓	✓	✓
<b>Placement services</b>			
Intensive placement counseling		✓	✓
Placement offers			
Online job market (§35 SGB III)			
<b>Promotion services</b>			
Placement promotion (§44 SGB III)			
Activation and integration (§45 SGB III)			✓
Training voucher (§81-87 SGB III)			
Targeted wage subsidy (§88 SGB III)			

## B Details of the identification

The treatment of interest is a voucher awarded during the first twelve months after registration as a job returner between January 2003 and December 2005. Each woman is observed for at least 76 months. The award of a voucher is denoted  $D_i \in 0, 1$  (for individuals  $i = 1, \dots, N$ ). The outcome variable is denoted  $Y_{it}$  (where  $t = 1, \dots, 76$ ) and indicates the number of months since the voucher was awarded. To account for the dynamics of the assignment process, I match on the time elapsed between return and treatment in the main evaluation. Following the notation described in Rubin (1974), the potential outcomes are indicated as  $Y_{it}^d$ , where  $d = 1$  under treatment and  $d = 0$  otherwise. For each job returner, only the realized outcome is observed. Thus, the potential outcome  $E[Y_{it}^1 | D_i = 1]$  is directly observed from the data.  $E[Y_{it}^0 | D_i = 1]$  is the counterfactual expected potential outcome as  $Y_{it}^0$  is never observed in the treated sub-population and is the expected non-treatment outcome of those who received a training voucher. I aim to identify the expected difference  $\gamma_t$  between the outcomes  $Y_{it}^1$  and  $Y_{it}^0$  of the women who received a training voucher in each month of the post-treatment period

$$\gamma_t = E[Y_{it}^1 | D_i = 1] - E[Y_{it}^0 | D_i = 1].$$

**Assumption 1** (*Conditional Mean Independence*). For all  $d \in \{0, 1\}$ ,

$$E[Y_{it}^d | D_i = 0, X_i = x] = E[Y_{it}^d | D_i = 1, X_i = x] \text{ for } \forall x \in \mathbb{X},$$

and  $t \in 1, \dots, 76$ , where  $\mathbb{X}$  denotes the support of  $X_i$ , and all necessary moments exist. The (pseudo) start dates  $M$  of the treatment are included in the vector of control variables ( $M \in X$ ). When the CIA holds, conditional on the pretreatment control variables  $X_i$ , individuals are randomly assigned to the treatment, and the expected potential outcomes are independent of the treatment status  $D_i$ .

**Assumption 2** (*Common Support*).

$$0 < p(x) < 1, \text{ where } p(x) = Pr(D_i = 1 | X_i = x)$$

where  $p(x)$  is the conditional treatment probability (propensity score). I enforce Assumption 2 by excluding all observations outside the common support from the estimations (only 0.03%). This approach does not affect the results.

## C Descriptive statistics

Table C.1: Means of observed characteristics with small standardized differences

	(1) Treatment- group	(2) Control- group	(3) SD between (1) and (2)	(4) Matched Control group	(5) SD between (1) and (4)
<b>Personal and family characteristics</b>					
Age 30-34 years	0.226	0.300	16.945	0.270	10.163
Age 35-39 years	0.287	0.241	10.537	0.309	4.733
Age 45-49 years	0.082	0.049	13.369	0.066	6.117
Health problems	0.042	0.088	18.921	0.039	1.528
Not German	0.055	0.070	6.369	0.070	6.571
Children	0.857	0.913	16.793	0.903	13.432
Number of children	1.655	1.694	3.901	1.729	7.390
<b>Educational and vocational degrees</b>					
No educational degree	0.017	0.054	19.957	0.030	8.022
Schooling degree without Abitur	0.743	0.803	14.377	0.749	1.332
Missing	0.004	0.001	4.430	0.002	2.352
Vocational degree	0.751	0.700	11.413	0.722	6.520
Academic degree	0.078	0.046	13.478	0.084	2.105
<b>Last occupation</b>					
Full-time work	0.369	0.457	17.786	0.367	0.393
Part-time work	0.355	0.383	5.772	0.391	7.370
Worker type: missing	0.136	0.194	15.672	0.150	4.018
Agriculture, forestry and farming	0.019	0.046	15.163	0.019	0.036
Production and manufacturing	0.084	0.108	8.139	0.078	2.475
Construction and architecture	0.014	0.022	5.538	0.023	6.319
Science and information services	0.021	0.018	2.593	0.015	4.595
Traffic and logistics	0.110	0.143	9.971	0.143	9.771
Commercial service, trading and sales	0.160	0.205	11.680	0.176	4.220
Health, social sector and teaching	0.133	0.139	1.612	0.138	1.348
Humanities and social science	0.017	0.016	0.989	0.016	0.829
Missing	0.038	0.046	4.417	0.041	1.887

< table continues on next page >

Table C.1: &lt; continued &gt;

	Treatment- group	Control- group	SD between (1) and (2)	Matched Control group	SD between (1) and (4)
<b>Interruption and return characteristics</b>					
Status prior interruption					
Apprenticeship	0.015	0.006	8.845	0.016	1.310
Elapsed duration until treatment	3.961	3.678	8.874	3.938	0.711
Return 1st quarter 2003	0.121	0.066	19.137	0.114	2.094
Return 2nd quarter 2003	0.110	0.066	15.617	0.078	11.048
Return 3rd quarter 2003	0.148	0.096	15.800	0.133	4.311
Return 4th quarter 2003	0.146	0.105	12.417	0.125	6.338
Return 1st quarter 2004	0.166	0.147	5.368	0.168	0.541
Return 2nd quarter 2004	0.118	0.144	7.712	0.135	5.009
Registration: unemployed	0.680	0.635	9.458	0.646	7.189
Registration: searching	0.320	0.364	9.237	0.354	7.144
<b>Labor market history</b>					
Months with benefits last 1 years	3.253	4.082	18.041	2.538	8.433
<b>Regional characteristics</b>					
Baden-Württemberg	0.097	0.083	5.098	0.105	2.491
Berlin, Brandenburg	0.085	0.124	12.909	0.078	2.451
Lower Saxony, Bremen	0.118	0.087	10.238	0.126	2.457
Hesse	0.072	0.045	11.547	0.064	3.067
Rhineland Palatinate, Saarland	0.051	0.034	8.305	0.038	6.511
Share of employed mining	0.005	0.005	0.338	0.004	6.603
Share of employed production	0.249	0.233	18.757	0.256	2.974
Share of employed energy and water	0.009	0.010	14.519	0.009	3.218
Share of employed trade	0.151	0.148	17.546	0.152	5.873
Share of employed tourism	0.029	0.029	2.788	0.028	0.910
Share of employed communication	0.055	0.058	18.577	0.055	3.550
Share of employed real estate	0.120	0.115	13.104	0.116	9.315
Share of employed health and social	0.117	0.117	0.742	0.118	1.143
Share of employed services	0.047	0.048	10.226	0.047	1.681
Share of employed ext. organisation	0.001	0.001	9.163	0.001	1.958
Population density (per km <sup>2</sup> )	722	569	10.830	574	11.084

Note: In columns (1) and (2), the mean values of observed characteristics for the treated and non-treated sub-samples are reported. Column (4) shows the mean values of the matched control group. Information on individual characteristics refers to the time of registration as job returner in local employment agencies, with the exception of the monthly regional labor market characteristics which refer to the (pseudo) treatment time. I report the standardized differences (SD) between the different samples before and after matching multiplied by 100. The variables included in the estimations are listed in the third row of Table 3.

## D Cumulated effects

Table D.1: Cumulated months of employment and earnings (all outcomes)

	Cumulated months after treatment							
	6	12	24	36	48	60	72	76
Months employed	-0.17 (0.49)	-0.21 (0.12)	-0.03 (0.28)	0.57 (0.45)	1.69 (0.64)	3.16 (0.84)	4.58 (1.04)	5.07 (1.10)
Monthly earnings in Euro	-437 (101)	-589 (178)	-193 (320)	734 (552)	2,681 (843)	5,049 (1,202)	7,521 (1,630)	8,360 (1,787)
Months full-time employed	-0.09 (0.03)	-0.10 (0.08)	0.05 (0.18)	0.52 (0.30)	1.30 (0.43)	2.21 (0.58)	3.11 (0.72)	3.38 (0.76)
Months at least 100% previous earnings	-0.05 (0.03)	-0.02 (0.07)	0.04 (0.19)	0.29 (0.31)	0.70 (0.46)	1.34 (0.63)	1.95 (0.80)	2.16 (0.86)
Months marginally employed	-0.80 (0.15)	-1.50 (0.27)	-2.45 (0.46)	-3.14 (0.59)	-3.57 (0.71)	-4.14 (0.84)	-4.67 (0.98)	-4.89 (1.04)
Months in stable employment	-0.08 (0.03)	-0.12 (0.10)	-0.01 (0.27)	0.37 (0.44)	1.19 (0.66)	2.29 (0.90)	3.47 (1.14)	3.85 (1.21)

Note: Accumulated effects are presented for each of the 76 months following the treatment. Significance levels are bootstrapped with 499 replications.

## E Sensitivity analysis

In this sensitivity analysis, I contrast the results obtained using a 12-month treatment window and conditioning on the pseudo elapsed duration since return (see the detailed explanation in Section 3.2) to different evaluation approaches and control group definitions. First, I consider a pure static approach for a treatment window of 12 months. Second, to check the sensitivity of the results with respect to the potential bias raised by Frederiksson and Johansson (2008), I follow Lechner et al. (2011) and shorten the treatment window to six and three months, respectively. This approach should reduce the potential bias from a positively selected control group; however, the population for which I estimate the effect changes too. Third, I estimate the effects from a dynamic approach as proposed by Sianesi (2004). The number of observations considered in the different approaches are shown in Table E.2.

The results obtained by different evaluation samples are presented in Figure E.1. There are only small differences between the main effect estimates obtained from using a 12-month treatment window and the (pseudo) elapsed duration as an additional control variable (indicated by the solid blue line) compared to the pure static approaches using different time windows. When I control for the (pseudo) elapsed duration in the static approach to accommodate the critique of Frederiksson and Johansson (2008), I find that the lock-in effects on employment are somewhat less pronounced. This finding might indicate that I correct for the bias predicted by Frederiksson and Johansson (2008) by retaining

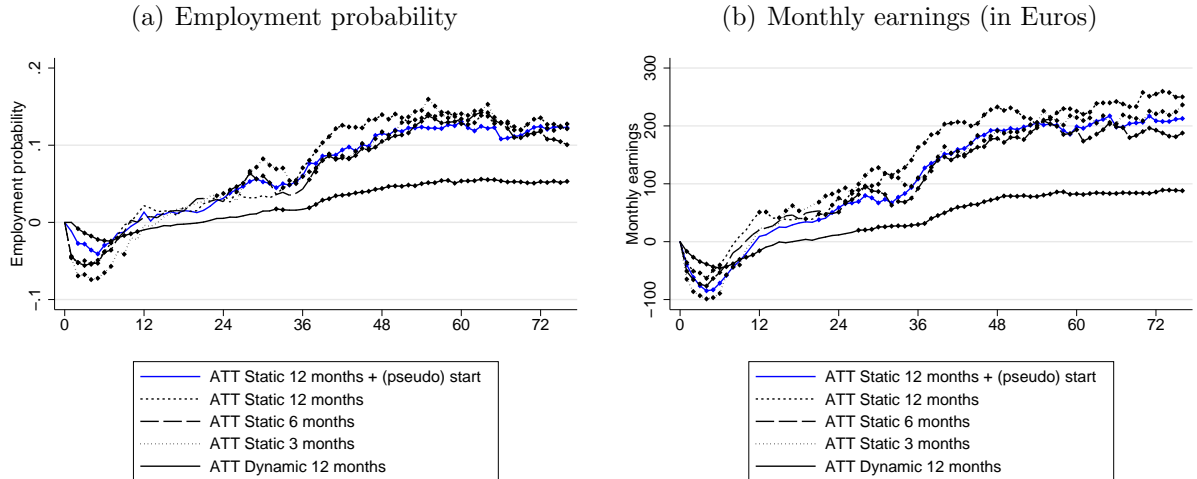
Table E.2: Number of observations in the different evaluation samples

Static evaluation approach												
Time window	12 months + (pseudo) elapsed duration				12 months		6 months		3 months			
Num. treated	2,986				2,986		2,087		1,243			
Num. controls	3,461				3,748		4,647		5,491			
Dynamic evaluation approach												
Elapsed duration	1	2	3	4	5	6	7	8	9	10	11	12
Num. treated	439	440	360	306	286	252	192	180	154	137	129	107
Num. controls	6,269	5,746	5,323	4,954	4,605	4,307	4,066	3,845	3,652	3,482	3,322	3,186

Note: The main sample is constructed using a static evaluation approach over a period of 12 months and condition on (simulated) start dates (pseudo elapsed duration). The employment and earnings effects using all different evaluation approaches are presented in Figure E.1 in Appendix E.

individuals in the control sample only to the extent that they are still unemployed at the pseudo start of the treatment. However, in the long run, the patterns of all static approaches are very similar.

Figure E.1: ATT using different evaluation samples



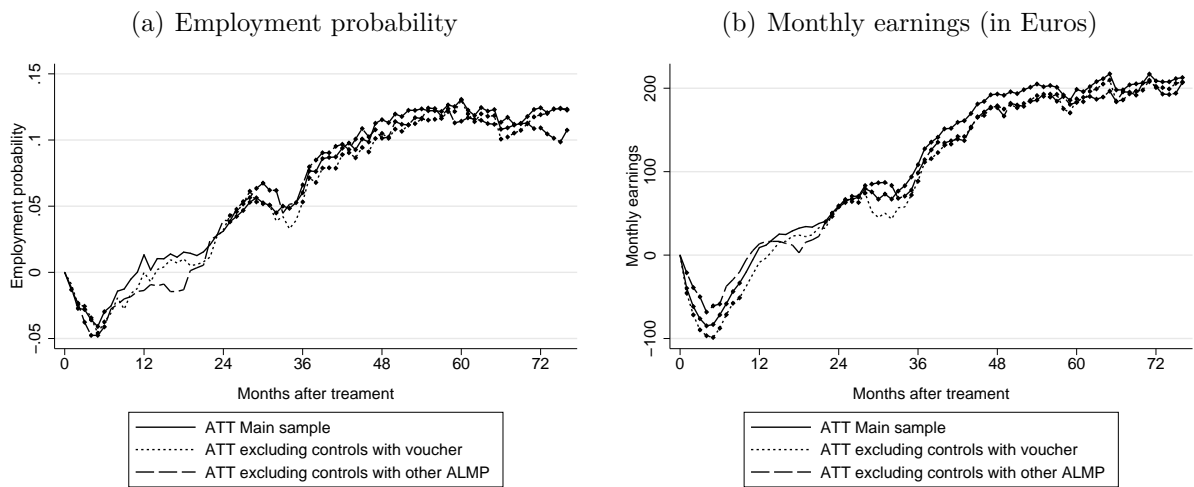
Note: Effects are estimated for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5%-level. Significance levels are bootstrapped with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

Because of the choice of the evaluation framework and the definition of the control group, I present a conservative estimate of the treatment effect relative to the never treated sample, as the control group includes individuals who receive a training voucher beyond one year after registration in the PES. This phenomenon reveals another weakness of the static approach: the treatment effect is re-defined each time the considered period in which treatment may occur changes. Another strand of the literature acknowledges this problem and identifies the treatment effect relative to the never treated (see Crépon et al., 2009, van den Berg and Vikström, 2019, Vikström, 2017) by right-censoring the outcomes



of the control sample when entering treatment. This approach is not feasible in this study because voucher assignments are observed in the data for 2003-2005 only. However, I observe a voucher assignment beyond 12 months after the registration period for 667 job returners. I perform another test in which I exclude these women from the control group. As an additional check, I exclude from the control sample those who participate in another ALMP program within and beyond the first 12 months after registration. The results remain very similar when I use these alternative control groups and are presented in Figure E.2.

Figure E.2: ATT using different control group definitions static approach



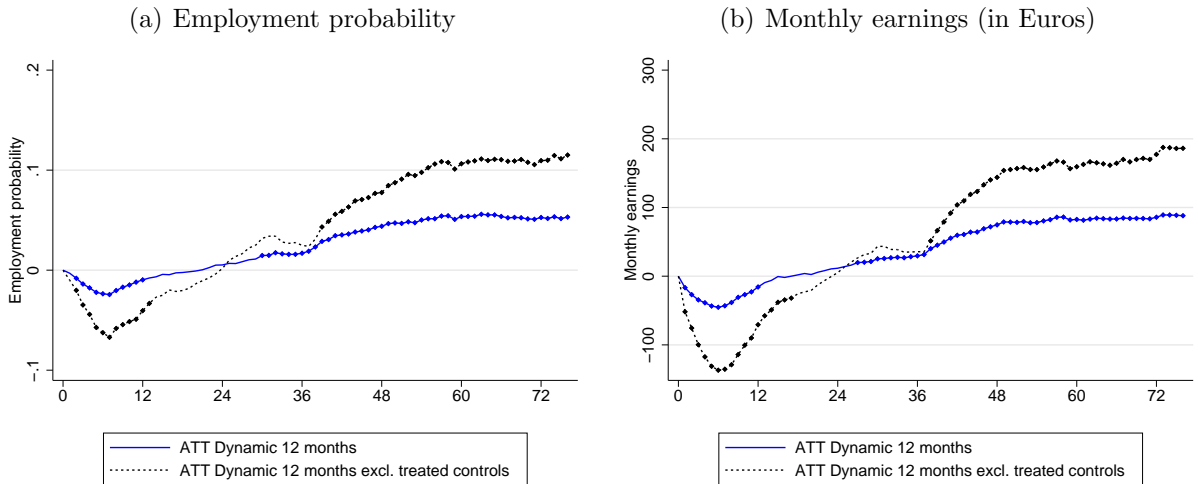
Note: Effects are estimated for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5%-level. Significance levels are bootstrapped with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

I find very different effects when applying a dynamic evaluation framework. The results from that approach are indicated by the solid black line in Figure E.1. If the bias discussed by Frederiksson and Johansson (2008) exists, the effects from a dynamic approach would be more positive compared to those obtained from a static approach. Therefore, I would find less negative effects during lock-in periods and higher effects in the longer run. The results from the dynamic approach do not support the predicted pattern in the case of a positively selected control group. Instead, I find evidence of an attenuation effect. Using the dynamic concept, I estimate the effect of receiving a training voucher now vs. receiving it later or never for each months over the treatment period. Thus, a fraction of control persons each month  $m$  will likely receive a training voucher in a following month  $m + t$ . The short-term effect estimates (lock-in effects) are closer to zero because I compare voucher recipients during their potential subsequent training participation with control persons who partly participate in training shortly thereafter. The lower effect estimates over the long term can be rationalized by the same argument.

Voucher recipients are compared with control persons who had partially participated in training and thus attenuate the estimated effects.

To test if this reasoning explains the difference between the results of the static and the dynamic approach, I exclude control individuals who are treated in the subsequent months from the control sample. The share of these job returners on the original control observations in the dynamic approach is large and ranges from 52% in the first months after treatment to 21% 12 months after treatment. When I estimate the effects in a dynamic approach comparing those who are treated in the respective months to those who are unemployed in that respective months but are not treated later, the results are very similar to those found with the static approach. I added a graph in which I show dynamic effect with and without the controls who are treated later in Figure E.3. This effect is a strong indication that these control observation drive the difference between the static and dynamic approaches.

Figure E.3: ATT using different control group definitions dynamic approach



Note: Effects are estimated for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5%-level. Significance levels are bootstrapped with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

## F Robustness checks

I seek to interpret the change in the employment outcomes of female job returners as a causal effect of receiving a training voucher. I perform several checks to support the causal interpretation and robustness of the results. First, I implement a pre-interruption outcome evaluation. Figure 2 illustrates that the outcomes of the treated and matched control groups already become similar when I condition on the observed characteristics. If time-constant unobserved characteristics lead to a selection bias that is not controlled

for by the included variables, it should be apparent in an impact evaluation prior to the interruption. Therefore, I use the same matched sample and empirical specification as in the main analysis in the post-treatment period and estimate the treatment effects on various points during the pre-interruption period.<sup>19</sup> The results are shown in Table F.1. The effect estimates are nearly never significantly different from zero.

Table F.1: ATT pre-interruption period

	Months before interruption									
	-1	-2	-3	-4	-5	-6	-12	-24	-36	-72
Employment probability	-0.001 (0.003)	-0.008 (0.022)	-0.004 (0.022)	-0.001 (0.022)	-0.005 (0.022)	0.002 (0.022)	0.045 (0.022)	0.013 (0.018)	0.008 (0.018)	0.000 (0.018)
Monthly Earnings	-5 (2)	10 (23)	-10 (24)	3 (25)	16 (26)	1 (28)	63 (43)	55 (43)	21 (40)	-5 (41)
Marginal employment	-0.017 (0.015)	-0.007 (0.013)	-0.005 (0.013)	0.002 (0.014)	0.003 (0.013)	0.002 (0.013)	-0.010 (0.013)	-0.017 (0.011)	-0.026 (0.008)	- -

Note: Effects are presented for each of the 6 months directly before interruption, as well as for 12, 24, 26, and 72 months before interruption. Marginal employment can be observed in the data since 1999. Hence, I cannot implement the impact evaluation 72 months before treatment for this outcome. Standard errors are bootstrapped with 499 replications.

One concern with this test is that the pre-interruption outcomes are related to the control variables that are used to balance the sample, particularly the employment history controls. Although the outcomes are measured on a monthly basis, and I use aggregated measures to control for the employment history, this procedure is a test more of internal validity than of external validity. Therefore, as a second strategy I implement two placebo validations to test for external validity. To construct the first placebo validation, I use the same sample of treated and control persons as for the main analysis. Then, I define a pseudo treatment start at exactly 12 months prior to the date when the interruption occurred and redefine the control variables accordingly. This method is possible for the large majority of controls but not for those capturing the interruption characteristics, e.g., the durations of the interruption period. The results for this test are presented in panel (a) of Table F.2.

For the second placebo validation, I select those treated and control observations for which I observe an unemployment period that starts no later than 12 months prior to the interruption period. Thus, this test is based on a sub-sample of job returners who experienced at least one period of unemployment before they withdrew from the labor market. I define the pseudo treatment start when they enter unemployment and redefine the control variables accordingly. I observe them over a period of 12 months. The results for this test are presented in panel (b) of Table F.2. None of the effects estimates from

<sup>19</sup>I use the employment probability, monthly earnings, and probability of being marginally employed in this robustness test. Since working full-time, earning at least 100% of previous earnings, and having a stable job are categories of the main employment variable, I do not use them in the pre-interruption outcome evaluation.

Table F.2: ATT pseudo treatment

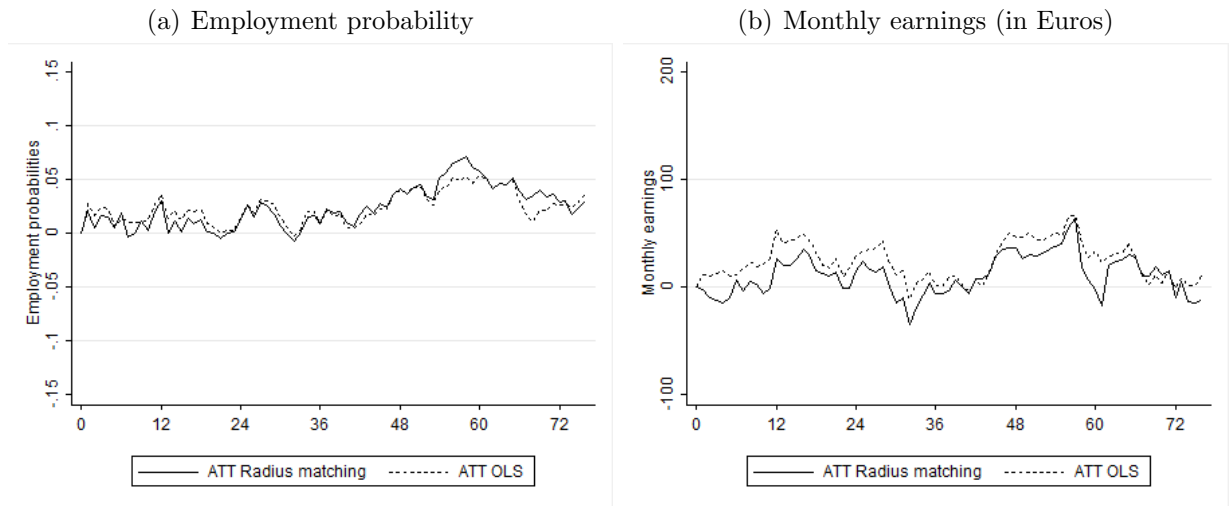
	Months after pseudo treatment											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel (a): Pseudo treatment 12 months prior to interruption (main sample)												
Employment probability	0.016 (0.021)	0.006 (0.021)	0.003 (0.021)	0.012 (0.020)	0.002 (0.020)	0.000 (0.020)	-0.015 (0.020)	-0.019 (0.020)	-0.025 (0.020)	-0.012 (0.019)	-0.010 (0.018)	-0.008 (0.018)
Monthly earnings	-25 (103)	-5 (97)	-12 (99)	12 (97)	-11 (98)	-11 (95)	-21 (90)	7 (85)	4 (81)	41 (81)	46 (82)	48 (84)
Marginal employment	0.033 (0.018)	0.027 (0.018)	0.024 (0.017)	0.025 (0.017)	0.021 (0.018)	0.018 (0.018)	0.022 (0.017)	0.020 (0.017)	0.021 (0.018)	0.008 (0.018)	0.017 (0.016)	0.007 (0.015)
Panel (b): Pseudo treatment no later than 12 months prior to interruption (sample of women with unemployment spell before interruption)												
Employment probability	-0.010 (0.021)	-0.020 (0.021)	-0.017 (0.021)	-0.014 (0.020)	-0.006 (0.020)	0.006 (0.020)	0.011 (0.020)	0.029 (0.020)	0.032 (0.020)	0.030 (0.019)	0.037 (0.018)	0.047 (0.018)
Monthly earnings	-14 (103)	-33 (97)	-37 (99)	-31 (97)	-40 (98)	-41 (95)	-35 (90)	-18 (85)	-1 (81)	-17 (81)	1 (82)	13 (84)
Marginal employment	-0.009 (0.018)	-0.011 (0.018)	-0.008 (0.017)	-0.008 (0.017)	-0.003 (0.018)	-0.003 (0.018)	-0.002 (0.017)	-0.004 (0.017)	-0.003 (0.018)	-0.004 (0.018)	-0.006 (0.016)	-0.002 (0.015)

Note: Effects are presented for each of the 12 months following the pseudo treatment date. Standard errors are bootstrapped with 499 replications.

both pseudo treatment evaluations is significantly different from zero. The results from all tests together strongly support a causal interpretation of the estimated effects.

In the third test, I use the unredeemed training vouchers to perform a specification test. I focus on the post-treatment period instead of the pre-interruption period. This approach allows me to rule out selection effects that may occur shortly before treatment (e.g., anticipation effects). If such effects exist, they should also be visible in the effect estimates of the job returners who did not redeem their training vouchers. The corresponding results are shown in Figure F.1. Because the number of observations is markedly reduced (90% of all job returners redeem their training vouchers), I present additional effect estimates obtained by a linear regression. Both estimators imply that the treatment effects of the unredeemed vouchers are almost never significantly different from zero. Again, I interpret this result as a confirmation of the robustness of the presented results.

Figure F.1: ATT for unredeemed training vouchers



Note: Effects are estimated for each of the 76 months following the treatment. Diamonds report significant point estimates at the 5 percent level. Significance levels are bootstrapped with 499 replications. Lines without diamonds indicate that point estimates are not significantly different from zero.

## G More results on heterogeneous effects

Table G.1: Heterogeneity by program type and vocational degree

	6	12	24	36	48	60	72	76
Practice firms and short training programs								
No vocational degree								
Employment probability	0.007 (0.037)	0.027 (0.038)	0.047 (0.060)	0.022 (0.061)	0.035 (0.065)	0.070 (0.061)	0.068 (0.070)	0.102 (0.069)
Monthly earnings	-26 (42)	52 (52)	73 (70)	52 (78)	76 (90)	86 (77)	77 (95)	102 (95)
Vocational degree								
Employment probability	0.016 (0.019)	0.085 (0.026)	0.101 (0.027)	0.078 (0.031)	0.085 (0.032)	0.120 (0.033)	0.115 (0.033)	0.115 (0.032)
Monthly earnings	-44 (25)	65 (32)	112 (34)	101 (39)	127 (41)	174 (43)	199 (48)	205 (50)
Academic degree								
Employment probability	-0.082 (0.073)	0.031 (0.089)	-0.019 (0.097)	-0.027 (0.111)	-0.119 (0.100)	-0.141 (0.100)	-0.043 (0.108)	-0.042 (0.106)
Monthly earnings	-136 (100)	104 (146)	118 (166)	117 (172)	81 (174)	-22 (218)	75 (210)	58 (221)
Long training programs								
No vocational degree								
Employment probability	-0.077 (0.043)	-0.060 (0.055)	-0.016 (0.076)	0.087 (0.076)	0.139 (0.083)	0.161 (0.077)	0.189 (0.091)	0.183 (0.087)
Monthly earnings	-115 (46)	-63 (69)	9 (86)	239 (113)	301 (118)	249 (110)	286 (136)	256 (113)
Vocational degree								
Employment probability	-0.063 (0.023)	0.044 (0.034)	0.155 (0.038)	0.152 (0.045)	0.140 (0.042)	0.207 (0.046)	0.211 (0.046)	0.194 (0.044)
Monthly earnings	-174 (32)	10 (41)	216 (43)	211 (47)	197 (50)	300 (55)	375 (60)	354 (63)
Academic degree								
Employment probability	-0.045 (0.070)	-0.045 (0.096)	-0.003 (0.111)	-0.104 (0.116)	-0.042 (0.116)	-0.055 (0.117)	0.004 (0.116)	-0.007 (0.114)
Monthly earnings	-182 (114)	-117 (166)	1 (192)	-149 (201)	-61 (220)	-428 (477)	99 (275)	81 (272)
Retraining programs								
No vocational degree								
Employment probability	-0.060 (0.024)	-0.046 (0.025)	-0.048 (0.038)	0.107 (0.044)	0.282 (0.050)	0.333 (0.049)	0.321 (0.054)	0.332 (0.053)
Monthly earnings	-49 (28)	-56 (29)	-27 (41)	179 (56)	413 (68)	456 (74)	478 (79)	506 (80)
Vocational degree								
Employment probability	-0.103 (0.019)	-0.143 (0.026)	-0.127 (0.028)	0.042 (0.034)	0.248 (0.037)	0.242 (0.039)	0.214 (0.039)	0.223 (0.040)
Monthly earnings	-149 (23)	-189 (30)	-127 (34)	100 (42)	349 (53)	325 (53)	322 (55)	337 (54)
Academic degree								
Employment probability	-0.047 (0.085)	-0.178 (0.095)	-0.142 (0.143)	-0.083 (0.163)	0.167 (0.117)	0.216 (0.166)	0.106 (0.171)	0.185 (0.167)
Monthly earnings	-166 (137)	-257 (186)	-221 (213)	-217 (270)	72 (310)	-29 (588)	-81 (392)	95 (377)

Note: Significance levels are bootstrapped with 499 replications.