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Informing employees in small and medium sized firms about training: results of a randomized field experiment[a]

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Abstract: We mailed brochures to 10,000 randomly chosen employed German workers eligible for a subsizided occupational training program called WeGebAU, informing them about the importance of skill-upgrading occupational training in general and about WeGebAU in particular. Using survey and register data, we estimate effects of the information treatment brochure on awareness of the program, on take-up of WeGebAU and other training, and on subsequent employment. The brochure more than doubles awareness of the program. There are no effects on WeGebAU take-up but participation in other (unsubsidized) training increases among employees aged below 45. Short-term labor market outcomes are not affected.

JEL-Codes: J24, J65.

Keywords: employment, wages, skills, randomized controlled trial, information treatment.

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1. Introduction

Life-long learning and employability have become focal points in the labor market policies of many advanced economies (see e.g. OECD Employment Outlook 2004). Economies face more turbulent conditions than in the past, and this requires a flexible and suitably skilled workforce. As the development of novel production technologies proceeds at a sustained high speed, human capital adjustments are not only warranted among the inflow of new workers but also among the existing stock of workers. The extent to which training is used differs across employer and worker types. In particular, small and medium sized enterprises (SME; defined as firms with less than 250 employees; see EU, 2018) face more difficulties in organizing, structuring and financing training activities than large firms. Large firms usually have specialized human resource managers organizing the firm's training activities. Regarding employees, training participation rates differ in particular by age and qualification. Older workers participate less often in training (Klehe et al., 2012). Firms may invest less into them due to the relatively short remaining time horizon in the firm and due to a perceived lack of cognitive abilities to adopt skill upgrades.

Therefore, it is important to investigate whether the inflow into training among SME employees can be influenced. In this study, we design and use a randomized experiment for this purpose. In particular, we evaluate a German program called WeGebAU that subsidizes training for workers in SME by covering a substantial share of training costs. The part of the program that we consider supports training that enhances the skills that a worker needs in his or her current occupation. The training is not supposed to be purely job-specific and can typically be combined with continued employment, taking a few weeks or months. Caseworkers of the local Employment Office decide on eligibility. The training takes place at private providers. Take-up rates of this program have been remarkably low during recent years (see below). We sent out brochures – an information treatment – to randomly selected eligible workers. The brochure has two informational components. First, it emphasizes the importance of lifelong learning. Secondly, it informs about the WeGebAU training subsidy. Using matched firm and individual register data and survey data, we investigate to what extent the information treatment increases workers' knowledge and take-up of the program as well as their participation in other training and their short-term labor market outcomes.

Randomized controlled trials on policies for employed workers in advanced economies are rare (see Crépon and van den Berg, 2016).[1] It is important to set out the advantages and limitations of this study design in our specific context. As the randomized brochure provides two pieces of information, it may accordingly lead to two types of subsequent actions. First, an increased awareness of WeGebAU may increase its take-up. Secondly, an increased awareness of the importance of lifelong learning may increase take-up of other types of available training. Moreover, each type of information may lead to a range of behavioral responses before any training is received. For example, individuals may change jobs before training is received in the expectation that a future employer is more accommodating with respect to training opportunities. All in all, the scope for instrumental variables analyses of training effects based on the brochure is therefore rather limited, and it is difficult to theoretically predict the sign of effects on labor market outcomes. Since workers have some leeway in choosing when to receive training, it is interesting to consider long-run outcomes, but that would require a substantially larger observation window than currently available. Nevertheless, the study design allows for the estimation of a number of interesting effects by exploiting the randomized nature of the brochure receipt. This includes effects on the awareness of WeGebAU and effects on the take-up of various types of training and on short-run labor market outcomes such as job mobility. In particular, it is interesting to assess the relative importance of the various pieces of information in the brochure on the mix of training types that is subsequently chosen. This provides insights into the extent to which this can be influenced by providing information to them beforehand.

The paper is organized as follows. Section 2 gives a short review of the literature related to occupational training of employed workers, and Section 3 describes WeGebAU in detail. Section 4 discusses the usage of information treatments for inference and describes our data. Section 5 presents the results, and Section 6 concludes.

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[1] An exception we discuss below is Görlitz and Tamm (2017), who analyse an information treatment about the "Bildungsprämie" program. Other RCT studies to evaluate active labor market policies in Germany are restricted to van den Berg et al. (2017), who evaluate an information treatment about a targeted wage support program for older workers, van den Berg et al. (2016a), who evaluate the use of integration agreements in placements services, and Krug and Stephan (2016), who compare random assignment into a public and private provision of placement services.

2. Skill-enhancing occupational training of employees in small and medium sized enterprises

2.1 Usage

SME invest less in their employees' human capital than larger firms (Kitching, 2008). For establishments in Germany, Bellmann and Leber (2008) show that around 40 percent of small establishments with up to 49 employees offered training in a broad sense to their employees in 2005, whereas more than 80 percent of establishments with 50 to 249 employees provided training opportunities, and nearly all establishments with more than 250 employees did. One may envisage several reasons for the lower training usage at SME. Smaller firms tend to face a higher worker turnover, so that they may perceive lower firm-specific benefits from training. Also, their profit levels are on average lower, so that they may not have sufficient funding to provide training. Re-organizing work tasks during training absences is more difficult than in larger firms, and potential quantity discounts from training providers may be lower.

Another notable dimension along which WeGebAU usage varies is age. In general, older workers participate less frequently in training. Employers may hesitate to train workers with a comparatively short residual time horizon in the firm (Roscigno et al.,2007). Furthermore, supervisors and managers often presume that older worker are less willing or able to learn (Posthuma and Campion, 2009; Maurer et al., 2008). Indeed, from an individual's perspective, the decreasing time horizon for training to pay off may be discouraging, and their learning attitudes as well as abilities may differ from those of younger workers. Bellmann and Leber (2008) report that the share of older workers participating in training is particularly low in SME.

When should the government step in and finance formal training that is not specifically intended for the current job? As Bassanini et al. (2005) note, public training policies can be justified either on efficiency or equity grounds. If firms face imperfect competition and can compress wages, they should be able to provide general training without governmental support (Acemoglu, 1997; Acemoglu and Pischke, 1998). In a more competitive market, however, firms may be reluctant to provide training as competitors may benefit from their investments (Stevens, 1994). Furthermore, information asymmetries can cause an under-provision of training because firms may not be aware that training investments pay off (Chang and Wang, 1996). Thus, if firms do not provide training and workers are credit constrained, market failures may arise, justifying government interventions to subsidize training. As we

have seen, an under-provision of training activities may be more likely to occur in SME. Finally, if governments pursue the goal to give all people equal opportunities to participate in training, training subsidies for under-represented groups of workers may be socially desirable, even if they are not efficient (Bassanini et al., 2005).

Abramovsky et al. (2011) point out that governmental programs to stimulate employer-provided training entail high levels of deadweight loss. Firms participating in a subsidy support program might provide the same amount and type of training to their workers anyway.

2.2 Evidence on determinants and effects of training of employed workers

There is a substantial body of empirical evidence regarding the determinants of formal training that is not specifically intended for the current job only, and on the returns of training (for an early literature review, see Asplund, 2004). A comprehensive overview on workplace training in Europe is provided by Bassanini et al. (2005), and on vocational education and training in OECD countries by Ok and Tergeist (2003).

Concerning governmental efforts to stimulate employer-provided training in OECD countries, the outcome variables studied include the amount of training investment within the firm and the share of firms investing in training (Abramovsky et al., 2011; Görg and Strobl, 2006; Görlitz, 2010; Hidalgo et al., 2014; Müller and Behringer, 2012; Schwerdt et al., 2012).

Regarding worker-level outcomes such as productivity, employment stability and earnings, findings are mixed as well and tend to depend on the type of worker. Heinrich et al. (2013) and Andersson et al. (2016) find positive effects of a job training program (Adult Program of the Workforce Investment Act) on earnings, using propensity score methods. As mentioned in the introduction, there are only few studies using RCTs. Hidalgo et al. (2014) analyze an RCT that provides randomly selected low-skilled workers in the Netherlands with training vouchers. They find that vouchers increased training participation but had no impact on wages or job mobility. Schwerdt et al. (2012) randomize adult education vouchers. They do not find any effect of the voucher on earnings, employment or subsequent education, one year after treatment.

Dauth and Toomet (2016) and Dauth (2019) use non-experimental methods to study aspects of WeGebAU; for expositional clarity we discuss these studies after our detailed description of WeGebAU below. Görlitz and Tamm (2017) evaluate a German training voucher program targeted to low-income low-skilled employees and self-employed persons, called the “Bildungsprämie” voucher. During their observation window, the voucher reduced

direct training costs by 50 percent, up to the comparatively small amount of 500 Euro. The remainder of the costs had to be borne by the employees themselves. For the study, half of around 5,000 participants in a telephone survey were informed about the voucher as part of the interview. A second survey took place around one year later. The authors find that the intervention significantly increased knowledge about the "Bildungsprämie" but did not affect voucher take-up or training participation.

3. The WeGebAU program

3.1 Background

WeGebAU ("Förderung der Weiterbildung Geringqualifizierter und beschäftigter Älterer in Unternehmen", or "Supporting further education of low-skilled employed older workers in companies") was introduced in 2007. In this program, the German Federal Employment Agency (FEA) allocates funds for formal training to individual workers, where the training should not be exclusively or primarily beneficial for the performance in the current job only, but rather be beneficial in alternative jobs as well. That is, it should be skill enhancing and build on the current expertise in the current occupation. The WeGebAU program targets two sets of workers. First, cost reimbursement for training is granted to workers employed in SME with less than 250 employees irrespective of their qualification.[2] Second, cost reimbursement in conjunction with wage support during training is provided for low-skilled workers. Workers classify as low-skilled if they lack a vocational degree or if they had an unskilled job in at least the previous four years. The randomized controlled trial in our paper restricts attention to the first-mentioned target group.

All in all, the WeGebAU program is rather small compared to other instruments of active labor market policy in Germany. During the years 2012 to 2016, the program had on average less than 7,000 entries of SME employees per year. In the next subsection we describe in detail how entitlement and training are decided and organized.

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[2] The firm size threshold of 250 suggests a regression discontinuitiy (RD) design to evaluate the subsidy. However, in our data, take-up rates around the threshold are too low for that. Moreover, firms may strategically influence their size with an eye on the subsidy.

3.2 Training eligibility and practical implementation of WeGebAU

3.2.1 Formal guidelines

The program subsidizes training of workers in SME through the reimbursement of the training costs, that is, the amount of money that the training provider receives in return for the training. In addition, costs for transportation, accommodation and childcare are refunded. Training costs of workers aged below 45 can be supported by maximum of 50 percent if the employer covers the remaining training costs. Workers at least 45 years old up can be subsidized up to a maximum of 75 percent. The remaining 25 percent have to be covered by the employer or the employee.

The decision to subsidize and the decision on the amount of reimbursement are made by a caseworker at the local employment agency. These caseworkers belong to the "employer service" department in the agency. They support firms, e.g., to find adequate workers.[3] In larger agencies, some of these caseworkers may be specialists for WeGebAU; they would process all WeGebAU applications.

To be subsidizable, the training has to meet several conditions. First, it must last for at least four weeks. Second, it must be certified. The provider itself also needs to be certified (i.e., accredited) to train workers that are subsidized by the FEA. For this, the provider needs to apply at one of the 31 accreditation bodies in Germany. These bodies are themselves accredited by the German national accreditation body. They verify that providers and courses meet the necessary standards to qualify for public support.

A third condition is that training must not be firm specific. In practice this implies that transmitted knowledge is useful in the labor market beyond the current job. For example, the program may involve the acquisition of skill updates for occupations in elderly care, machine operation, transportation, the operation of heavy equipment, IT, or administration. In contrast, the FEA does not subsidize informal on-the-job training or in-company courses, e.g., instructing workers how to use new machines that replace older machines and that are specifically tied to the current job. Clearly, there is a thin line here between what is only

[3] Local employment agencies are structured into an employer service and an employee service. Caseworkers of the employee service handle job-seeking workers and try to help them find a new job. Caseworkers of the employer service counsel firms and try to help them find adequate personnel.

useful in the current job and what is also useful elsewhere. This is reflected in the discretionary power of the caseworkers. Note also that the WeGebAU programs evaluated here do not include vocational training programs that cover years and that teach a new occupation, or lengthy courses in regular adult education programs.

A fourth condition is that in the period that subsidies are transferred, workers continue to be employed in their current job and receive their regular wages for all hours including the hours during which they are in training.

In 2014, the average reimbursement per WeGebAU-participant amounted to about 3,800 Euros (Statistics of the Federal Employment Agency, own calculations).[4] This amount comprises the fee that the training provider receives plus additional costs of the participants due to transportation to the training location, accommodation and child care covered by the FEA. The FEA transfers monthly rates to participants to cover these additional costs in advance. Training providers receive monthly rates which cover 50 to 75 percent of the course fees depending on the target group of the program with a delay of 30 days after the start date of the training course. A contract between training provider and participant records whether the worker or the employer cover the remaining fees.

3.2.2 Enrollment in practice

As an active labor market program, WeGebAU is unique in that it takes place during working hours of employed workers. As a consequence, caseworkers, employees and employers each may affect selection into the program. How selection occurs in this tripartite relationship is not well documented. To obtain some insights into the underlying mechanisms, we carried out a small qualitative study with the help of experts on the practical implementation on labor market policies. These experts, employed by the FEA, conducted interviews in different local employment agencies with caseworkers who are involved in the WeGebAU entry decision process, in 2011. The interviews focused on the mode of initiating contact between caseworker and employer/employee, on how caseworkers decide on granting the subsidy, and on training contents and duration. The following paragraphs summarize relevant insights from the interview protocols.

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[4] Overall, the FEA allocated 56 million Euros to the program in 2014.

First, in the introductory phase of the program until 2009, before our observation window, caseworkers and so-called training counselors actively promoted the program. (Training counselors were employees of the local employment agencies or representatives of the companies providing training.) They sent out flyers, informed firms, work councils, and sectoral Chambers, and created joint conferences for employment agencies and firms. As a consequence, the program was well-known among firms in the data window we consider.

There are different ways for workers to enter training. Workers as well as firms approach caseworkers to initiate entry, but in most cases it is the firms that initiate contact. This suggests that the firms either already have identified workers they want to train or they identify potential training participants after the caseworkers explained program modalities. If workers initiate the subsidy claim then they are required to accommodate their wish for training with their employer. If the firm is not supportive even though the worker is eligible, the worker can in principle participate in the very same courses as WeGebAU participants. Preconditions are that the worker finds alternative ways to pay for training and that he or she participates during leisure time. Note that this is another reason for our information brochure to lead workers to pick up unsubsidized training, on top of the reason that the brochure highlights advantages of lifelong learning in general. Once potential participants are identified, the employer fills out a form that collects socio-demographic worker information, details on the employer and the employment relationship and information on the training course (content + provider) that is to be subsidized. Based on this form caseworkers make the final decision whether the general eligibility criteria are met and whether the subsidy is granted. Then caseworkers issue the training voucher that guarantees the cost reimbursement of a training course at an external training provider.

Caseworkers make their decision relatively quickly (within 1 to 7 days) after receiving the application form. How long it takes until training starts depends on the training provider. The waiting time varies from 1 day, when a course with remaining slots is just about to start, to 6 weeks. Caseworkers tend to decline subsidy applications if they do not expect there to be a suitable training course in the foreseeable future. This seems particularly to be the case in rural areas.

Workers and firms can search for training providers and courses on the FEA website, which provides access to the data base "KURSNET". This data base contains information for certified courses on the provider, content, location, training dates and duration, number of slots, full-time or part-time training, required prior skills, and whether training vouchers can be redeemed.

Table 1 shows that the majority of all subsidized WeGebAU courses lasted less than 4 months and that training for younger workers was shorter than for older workers. Note that the time in months does not take account of hours per week in training. For example, a course with 1 hour per week training for 5 months is counted as a training with a duration of 5 months.

Table 1: Training duration among the inflow into WeGebAU-subsidized training in 2014 in percentage.

...in months…	**Up to age 45**	**45 and older**
< 4	50.9	40.9
4 to <8	18.6	18.8
8 to <11	8.4	11.2
11 to <13	10.5	17.8
≥13	11.6	11.3
N	4,468	2,381

Source: Statistics of the Federal Employment Agency (data warehouse).

Participation in WeGebAU training was evaluated in two non-experimental studies with a focus different from ours. Dauth and Toomet (2016) use propensity score matching to analyze employment outcomes and earnings of *older* workers in SME participating in the WeGebAU program during the start-up period 2007 to 2009. They find an increased probability to remain employed particularly for part-time workers, and those participating in measures longer than 60 days. They find small significant effects on earnings for the entire group of participants. Dauth (2019) analyzes the effects of training subsidies for *low-skilled* employees on individual labor market outcomes in Germany for the period from 2007 to 2012. She exploits cross-regional variation in the conditional policy styles of local employment agencies and estimates local average treatment effects for compliers that participate only in training because of a more generous local policy style. For this group, the subsidies significantly increase cumulative employment duration by 30 days and earnings by 6 percent within the first three years after treatment start.

4. Information treatment, data and methods

4.1 Information treatments

Individuals often fail to take up benefits that they are eligible for (Currie, 2006). A lack of information, stigma effects of program participation, transaction costs, and complexity are candidates to explain incomplete take-up. Regarding information that is not used, Handel and Schwartzmann (2018) further distinguish between information frictions – costs of acquiring and processing information – as well as mental gaps, which they define as psychological distortions in information-gathering, attention, and processing.

A growing body of evidence suggests that individuals are often not fully informed about transfer policies relevant for economic choices (e.g., Chetty and Saez, 2013; Liebman and Luttmer, 2015). The provision of information about available support programs thus can enable individuals to draw on additional resources when making their economic choices, altering these choices. To investigate this topic, a number of researchers have used the amount of information on the program as a treatment. Typically, such information treatments have been applied in randomized trials. The treatment is the receipt of an information brochure or letter, an information event, or a personal or telephone consultation.

The information treatment for our project consists of a short cover letter and an information brochure (see Appendix 1 for a translated version of the brochure): on June 2, 2014, we sent out the information brochure about WeGebAU and its entitlement conditions to the home addresses of approximately 10,000 randomly selected workers in SME. The brochure also points out the importance of life-long learning and the benefits of training in general. The next subsection contains a detailed description of the sampling and randomization scheme.

4.2 Data and methods

To gather a sample of workers eligible for receiving the WeGebAU subsidy, we combine firm panel data and administrative data of the German Federal Employment Agency (FEA). Only workers at firms/enterprises with less than 250 employees could benefit from the SME subsidy program. As the register data of the FEA comprise only information on establishment size but not on enterprise size, and as an enterprise may consist of several establishments, we focus on workers employed in establishments that participated in the IAB Establishment Panel survey in 2012 (the latest wave available when the field experiment took place). Information from this survey allows us to determine firm size. To identify our target group,

we selected all single-establishment firms with number of employed workers <250, after excluding individuals without vocational degree. The latter would - unconditionally on firm size - have been eligible to a more generous subsidy scheme (see section 3).

To identify workers from the pre-selected firms, we merged the firm panel data with individual level register data from the Integrated Employment Biographies (IEB). The IEB contain the employment histories of all employed workers liable to social security contributions in Germany. Furthermore, it comprises information on workers' unemployment spells, periods of unemployment insurance or welfare benefit receipt, and periods of participation in a program of active labor market policy such as WeGebAU. As all this information is process-generated, start and end dates of the different spells have daily precision, and the information is highly reliable (Jacobebbinghaus and Seth, 2007, or Dorner et al., 2010). The IEB data are updated yearly. The selection of the sample for the experiment is based on the IEB version V11 from 2013 and took place on May 19, 2014. Under strict protection of data privacy, the Data and IT Management Unit of IAB provided home addresses from administrative data of the FEA for the selected sample.

Based on information in the IEB, we restricted the sample to workers who started fulltime employment that was liable to social security contributions before January 1, 2012, and who remained in this firm until the end of 2012, the latest moment observable in the most updated register data at the sample selection date. We focus on workers with permanent employment contracts, as firms have less incentives to train workers on temporary contracts. They should have been employed at least two years in the same firm when the information treatment took place. In Germany, firms can employ workers on temporary contracts for a maximum period of two years (excepted they can provide legally accepted good reasons).

Our final sample of administrative data used for the information treatment encompasses 10,672 workers aged below 45 and working in SME and 10,641 workers aged 45 or above and working in SME. Appendix 2 describes in detail how the final sample was obtained from the registers. For the experiment, we randomly selected 10,000 workers for the treatment groups: 5,000 workers younger than 45 years old as well as 5,000 workers of at least 45 years. For the control groups we used the remaining 5,672 workers below age 45 and 5,641 older workers. Randomization took place on May 19, 2014, using a digital random number generator. We sent out the letters on June 2, 2014. A total of 11,287 workers, i.e., 59 percent of our final sample, still had the same employer as in 2012 (the latest observable year when drawing the sample). Consequently, it is likely that some employed sample members did not

work at a SME when we sent out the brochure. However, this affected the treatment and the control group in the same way.

In the analysis we use register data and individual-level survey data. The register data are based on the updated IEB data set V13, containing information until the end of 2016 for all workers in our initial sample. Compared to the 21,313 workers from the sample that we used to create treatment and control groups, this sample is slightly smaller as it comprises 19,299 workers. This is because some workers had not received the brochure, or because the address was invalid, or they had passed away or refused to participate in the experiment after receipt of the brochure; see Appendix 2 for further information and for evidence that this does not affect our results.

The survey data concern computer-assisted telephone interviews between November 2014 and February 2015 (i.e., six to eight months after treatment). In the survey, we asked 2,042 workers from the SME sample questions about awareness of the WeGebAU program, participation in (unsubsidized) training, and reasons for (not) participating in training. To analyze if the workers who completed the interview differ in their characteristics from the pool of workers who were at least once contacted for an interview, we checked for differences in personal characteristics. Workers who completed the interview are more likely to have a high school degree and thus to be better qualified. This selectivity is, however, equally distributed over our treatment and control groups and should therefore not pose any problems for the validity of our further analyses.[5]

Table 2 shows sample statistics of the treatment and control group. As expected, due to random assignment we do not find any significant differences between the two groups. On average, workers in the younger sample are 34 years old, while the mean age in the older group is 51. The majority of workers has a lower or medium secondary degree; the share with a high school degree is larger in the younger age group. Around a quarter of workers are working part-time, and around 80 percent have a permanent contract. The mean gross wage rate is nearly 90 Euros per day. On average, workers in the sample had been working most of the five years before the treatment took place, but not necessarily for the same employer.

[5] Details are available on request. The survey date is orthogonal to the information treatment status.

Table 2: Selected characteristics (register data): Means for brochure receipt group B, control group C, and difference D.

	Up to age 45			45 and older			
	B	**C**	**D**	**B**	**C**	**D**	
Age	34	34	0	51	51	0	
Male	0,52	0,51	0,02	0,46	0,47	0,00	
Non-German citizen	0,06	0,06	0,00	0,03	0,03	0,00	
Lower or medium secondary schooling degree	0,60	0,60	0,00	0,73	0,74	-0,01	
High school degree	0,37	0,38	-0,01	0,24	0,23	0,01	
School information missing	0,02	0,02	0,00	0,03	0,03	0,00	
Part-time employment	0,25	0,25	0,00	0,30	0,29	0,01	
Permanent contract	0,77	0,77	0,00	0,85	0,86	-0,01	
Daily gross wage	87	87	0	88	90	-1	
Cumulative years of employment in past 5 years	4,26	4,24	0,02	4,55	4,56	-0,01	
Cumulative years of tenure in past 5 years	2,40	2,41	-0,01	3,06	3,13	-0,07	
Number of establishments in past 5 years	2,12	2,12	0,00	1,77	1,73	0,04	*
Number of observations	4318	5284		4487	5210		

Source: IEB V13, own calculations. *) α =0.05, **) α =0.01.

We now turn to the empirical approach. The chronological sequence considered in the experiment is as follows, where (1) occurs before (2a) and (2b) while (2a) and (2b) occur simultaneously, and so on and so forth. Potential WeGebAU participants do or do not:

(1) get an information brochure on the program,

(2a) gain knowledge about the program,

(2b) gain awareness of the importance of lifelong learning,

(3a) find and take up WeGebAU training,

(3b) find and take up a different training,

(4) realize particular labor market outcomes.

The experiment provides random variation at stage (1) of the sequence. We can use this variation to estimate average effects of receiving information on the program on outcomes at a further stage of the sequence. As the treatment and control groups were randomly chosen and characteristics of both groups are well balanced, a comparison of mean outcomes

suffices.[6] If the outcome of interest can only be realized after some other outcome (e.g. the destination state after exit out of the current job), it needs to be acknowledged that observability depends on the first event occurring at a date before the end of our observation window (see e.g. Abbring and van den Berg, 2005).

It is important to point out that the randomization outcome (1) is not a valid instrument for actual training (3a) + (3b). After all, individuals may adjust their behavior in-between the brochure and take-up of training. This reflects a common problem in dynamic evaluation analysis when the instrument is realized strictly before the treatment status is determined (van den Berg, 2007), which is particularly relevant in analyses where vouchers are assigned that can only be used after a positive amount of time.

One may argue that, nevertheless, (1) can be used as an instrument to estimate the effects of (2a) on (3a) and (4), e.g. using two-sample instrumental variables (2SIV) methods (see e.g. van den Berg et al., 2016b) to estimate local average treatment effects of program knowledge. Within our framework, however, the receipt of the brochure may also affect relevant behavior and outcomes of those who are not interested in WeGebAU. Notably, as already discussed in Section 1, the brochure may make individuals more convinced of the importance of training in general and thus to take up unsubsidized training more often, which may create a causal effect on their labor market outcomes that does not run through WeGebAU.

Subsection 5.3 explains that our data allow for some inference on windfall that occurs if the brochure induces workers to take up WeGebAU training (3a) at the expense of other training (3b). This is because a survey among firms includes a question on counterfactual outcomes.

[6] Robustness checks show that results hardly change if we incorporate propensity score kernel matching to control for chance differences in the distribution of observed characteristics in the treatment and in the control groups. Results are available on request.

5. Results

5.1 Survey data

As described above, the survey took place around 7 months after the brochure was sent out, where the survey date is orthogonal to brochure receipt. We use the survey to infer awareness of WeGebAU and to measure participation in training in the 7 past months, for those who received the brochure and those who did not, and to gauge the type of training and the views on the usefulness of training.

It is important to point out that, regarding participation in training, the register data allow for observation of WeGebAU spells but not for observation of non-subsidized training activities. Conversely, the survey data measure participation across all types of training without distinguishing between WeGebAU and other training. Discussion of estimated effects on WeGebAU participation is therefore deferred to Subsection 5.2 in which the results based on the register data are presented.

The most important survey results are in Panel I of Table 3. First, we consider effects on the awareness of WeGebAU. Among the brochure non-recipients, 21 percent of the younger workers and 27 percent of the older workers were aware of the program. This share increases remarkably, by 38 percentage points, among brochure recipients. This implies that the information treatment repairs information deficits by more than 180 percent for younger workers and 140 percent for older workers. Estimated standard errors are small (around a tenth of the estimated treatment effect). The size of the effects and the standard errors do not change if we additionally control for socio-demographic characteristics and the individual labor market history.

Next, Panel I shows that the information treatment does indeed increase the share of younger workers who participate in training, by 7 percentage points, from 43 to almost 50 percent. This increase includes training that yields some sort of vocational certificate as well as other types of training, but as we shall see, the effect is primarily driven by the latter.

The survey indicates that the additional training among younger workers that was generated by the brochure was nearly entirely based on the workers' own initiative. Only 14 percent of the young non-recipients initiated their training participation, while 20 percent of

the young recipients did so.[7] This result indicates that the brochure nudged part of the younger worker group to become interested in training, to explore training possibilities with their employer and participate in an adequate training program. Here we find no effect for the group of workers aged above 45.

We also asked brochure recipients directly about the brochure itself. Their responses (in Panel II of Table 3) should be viewed with caution. In the time interval between brochure receipt and survey interview, respondents may have forgotten about (reading) the brochure even if it subsequently affected their behavior. With this in mind, about half of the recipients claimed that they had in fact read it. Workers who declined having read the brochure were asked for the reasons behind this. Around 16 percent answered that they had already participated in any kind of training. Nearly 11 percent said that they are not interested in training at all. Around 8 percent do not want to receive support from the Federal Employment Agency. These workers might fear stigma effects if their training is subsidized, as the FEA is usually thought to be mostly concerned with unemployed workers.

We also inquired about the type of training used. Panel III of Table 3 displays the results (note that these relate only to those who actually participated in training before the end of the observation window). According to the survey respondents, more than 85 percent of the training courses provided knowledge that was not only useful at the current employer. Around 75 percent of training took place entirely during working hours, and for around 90 percent of the survey participants the firm covered the full training costs. Those who did not participate in training were asked about the reasons for that. The responses indicate that there is no single dominating reason. One reason concerns direct and indirect training costs. More than two thirds of those who did not participate in training do not want to forego income while in training and more than one third does not want to spend any money on training. More than 70 percent answered that their qualification is fully sufficient and more than half of these workers stated that they learn everything they need on the job. Bad health conditions was a reason to pass on training for every tenth worker.

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[7] Standard errors for the estimated effects on training participation and training initiative are around one third of the size of the effects. If we additionally control for socio-demographic characteristics and the individual labor market history, the estimated effects slightly increase and standard errors decrease.

Table 3: Survey outcomes, brochure receipt, and training features: Averages in recipients group (columns B) and non-recipients group (C), and their difference (D).

	Up to age 45				45 and older			
	B	**C**	**D**		**B**	**C**	**D**	
I Program awareness, training participation, and initiative								
Aware of the WeGebAU program	0.59	0.21	0.38	**	0.65	0.27	0.38	**
Participation in training	0.50	0.43	0.07	*	0.49	0.49	0.00	
Initiative for training came from worker	0.20	0.14	0.06	*	0.18	0.15	0.03	
II Brochure receipt								
Claims to have read brochure	0.51	-			0.50	-		
Claims to have received but to not have read brochure	0.26	-			0.24	-		
Claims not to have received brochure	0.23	-			0.26	-		
Did not read brochure because…								
...employer offered sufficient training	0.15	-			0.14	-		
…I was already trained	0.16	-			0.17	-		
…I did not want support from the FEA	0.09	-			0.07	-		
…I was not interested in training	0.11	-			0.11	-		
…I was generally not interested in commercials	0.18	-			0.16	-		
III Training features (only those participating in training since June 2014)								
Training yields general human capital	0.89	0.89	0.00		0.87	0.86	0.02	
Training took place in leisure time	0.14	0.11	0.03		0.11	0.11	0.00	
Training took place during working hours	0.74	0.74	0.00		0.75	0.77	-0.03	
Training took place during leisure and working hours	0.12	0.15	-0.03		0.15	0.12	0.03	
Worker covered training costs (mostly)	0.08	0.06	0.03		0.03	0.03	-0.01	
Firm covered training costs (mostly)	0.86	0.84	0.01		0.91	0.89	0.02	
Someone else covered training costs (mostly)	0.06	0.10	-0.04		0.06	0.08	-0.02	
IV Reason not to train (only those not in training during last 2 years)								
Not sure training pays off	0.26	0.20	0.06		0.31	0.23	0.08	
Don't want to forgo income	0.82	0.73	0.09		0.65	0.71	-0.05	
Don't want to spend any money on training	0.38	0.34	0.04		0.49	0.42	0.07	
Not used to studying anymore	0.27	0.19	0.08		0.28	0.29	-0.01	
Employer does not support training	0.22	0.25	-0.03		0.28	0.34	-0.06	
Time effort too high	0.28	0.17	0.11	*	0.36	0.17	0.19	**
Learn everything needed on the job	0.59	0.53	0.06		0.64	0.67	-0.03	
Qualification fully sufficient	0.71	0.71	0.00		0.73	0.79	-0.06	
Health condition does not allow for training	0.09	0.03	0.06	*	0.11	0.10	0.01	
No suitable training available	0.25	0.34	-0.09		0.48	0.40	0.07	
I have bad experiences with instructors	0.04	0.05	-0.01		0.03	0.06	-0.03	
Number of observations								
Panels I and II	484	502			510	490		
Panel III	242	218			252	242		
Panel IV	123	151			138	146		

Note: *) α =0.05, **) α =0.01.

Brochure recipients cite high time efforts more often as one of their reasons not to participate in training than respondents who did not receive a brochure. The difference in

citing this reason is particularly large among respondents aged 45 or above (going from 17 to 36 percent). Among the respondents aged below 45, the brochure affected training participation, so that the non-trained are no longer randomly assigned, but this does not apply to the older respondents. Presumably, among the latter group, the brochure strongly raised awareness of the time costs of training and maybe also increased concerns about the extent that these justify the time investment. In the concluding section we return to the difference in effects by age.

5.2 Register data

As explained above, the register data enable us to investigate effects on the take-up of the WeGebAU subsidy and on further labor market outcomes.[8] Furthermore, the register data are not subject to nonresponse and they cover a larger time span (up to about 19 months after the treatment).[9]

Table 4 shows that a very small fraction (less than 1 percent) of the treatment and the control groups actually participated in the WeGebAU program, and we find no significant difference between recipients and non-recipients of the information treatment. This simply echoes the low national inflow into WeGebAU. During the year 2014, only around 22.000 workers from SME and low-qualified workers entered the program. Combining our finding with the results from Subsection 5.1 we conclude that the increase in training participation among workers aged below 45 is fully accounted for by non-WeGebAU training. Thus, in this age class, the information treatment significantly increased general non-subsidized training participation.

We now turn to other labor market outcomes (see Table 4), with the caveat that these are sometimes only observed for potentially selective subsamples. First, if the brochure leads to training that increases younger workers' productivity, one may expect an increase in their wage rates and earnings. Regarding job stability it is not clear what to expect: on the one hand training typically requires some sort of cooperation or compliance from the side of the

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[8] As mentioned above, the register data do not contain information on unsubsidized training.

[9] The currently available data allow us to analyze outcomes until the end of 2016. However, only 12 additional workers in the sample enter the WeGebAU program in 2016, and the estimation results for the extended period are very similar to those reported.

employer, suggesting that training is associated with job stability. On the other hand, training may increase the workers' market value and hence lead to a transition into a different job. We use three variables to summarize the labor market states and transitions between May 2014 and December 2015. "Uninterrupted employment" captures whether the individual was employed all the time or not. "Job change" captures whether the individual was at some point employed at a different employer than the employer in May 2014. "Any unemployment" captures whether the individual was full-time unemployed at any moment in this period. Note that these three variables taken together are neither exclusive nor exhaustive. In particular, an individual may be employed for some months and be a non-participant (e.g. in early retirement) for the other months, in which case (s)he would score a zero on each of the three variables.

Table 4: Program participation and further labor market outcomes: Means for brochure receipt group B and control group C, and difference D (in shares and in Euro, respectively).

	Up to age 45			**45 and older**		
From the moment of treatment until December 31, 2015	**T**	**C**	**D**	**T**	**C**	**D**
WeGebAU participation	0.003	0.003	0.000	0.002	0.001	0.001
Job change	0.12	0.12	-0.01	0.08	0.07	0.00
Uninterrupted employment	0.71	0.70	0.01	0.77	0.77	0.00
Any unemployment	0.13	0.13	0.00	0.13	0.13	0.00
Average daily gross wage	82.49	82.13	0.35	84.14	85.60	-1.46
Number of observations	4318	5284		4487	5210	

Source: IEB V12, own calculations. *) α =0.05, **) α =0.01.

As it turns out, we do not find any significant differences between brochure recipients and controls (see Table 4). In fact, neither group displays much mobility across labor market states. The vast majority remains employed at the same employer. This may simply reflect the short length of the time interval in which labor market outcomes are registered. A period of 1.5 to 2.5 years after the information treatment may be insufficiently long to observe mobility differences. After all, individuals who want to be trained may take time to find a suitable training program; they may take time to agree with their employer on a suitable moment for the actual participation, and if this increases their chances for a better job elsewhere then they may take time to find such a better job. Also, any decrease in their likelihood to change jobs compared to the controls may only become visible after some years, as the controls have a low baseline mobility as well.

5.3 A note on windfall

Governmental support for firms to provide training bears the risk of deadweight losses. If brochure receipt increased subsidized training take-up, but the same training would have taken place anyway, the subsidy would have been just a windfall gain to the firm. As brochure receipt did not affect WeGebAU participation, it did not induce any deadweight losses. However, it may be that the current usage of WeGebAU involves deadweight loss, and to explore this further we took the initiative to include questions in the 2015 wave of the IAB Establishment Panel about this. Firms reporting that some of their workers took part in the WeGebAU program in the first half of 2014 were asked "Would you (your worker) have participated in training if the training had not been subsidized through WeGebAU?". Around one third of these firms answered this question with "yes". Thus, one third of firms that used WeGebAU subsidies for the training of their employees effectively stated that subsidized training replaced self-financed training. From the government's perspective this reduces the potential social benefits of the WeGebAU program, as the purpose of the subsidy is to induce additional training within firms.

5.4 Heterogeneous effects

We have seen in Subsection 5.2 that the effect of the information brochure on training take-up depends on age, which is a first indication that effects are heterogeneous. In this subsection we explore effect heterogeneity both on the awareness of WeGebAU and on take-up of training in more detail.

Table 5 shows that the increase in awareness generated by the brochure is quite uniform across different types of individuals. Also, decomposing the sample does not provide further insights regarding take-up among individuals aged 45 and above.

For individuals aged below 45, the stratified analyses reveal that the overall effects on training participation are driven by a few covariates. First, the effect can be attributed to gender. Men who received the brochure are 11 percentage points (28 percent) more likely to participate in training in the 6-8 months following the brochure receipt. Second, within the age range 25-44, it is the workers aged 40-44 who drive the effect. The brochure increases the share of trained workers in that age range by 21 percentage points (54 percent) and it simultaneously increases the share of those who initiated the training by 15 percentage points (150 percent). Table 5 indiciates that non-recipients of age 40-44 are less likely to participate in training or initiate training than non-recipients in the other age groups. Thus the

information treatment seems to be most effective for the age group with the lowest training rate. Third, in terms of job stability, it is the small group of workers who assess their job as unstable for whom the effect is largest – the brochure inceased their training participation by 12 percentage points (62 percent) and their initiative by 16 percentage points (178 percent). It is possible that those who expect to change their employer are already aware of training necessities and that our brochure nudged them to take action. However, recall that the information treatment was not strongly associated with job stability in the short run. This might be because such a connection only exists for a small subgroup.

Table 5: Heterogeneous effects with survey data outcomes: Averages for brochure receipt group T and control group C.

	Aware of the WeGebAU program			**Participation in training**			**Initiative for training came from worker**			**N**
	T	**C**		**T**	**C**		**T**	**C**		
Up to age 45										
Men	0.61	0.19	**	0.50	0.39	*	0.20	0.14		496
Women	0.56	0.22	**	0.50	0.48		0.20	0.14		490
<29 years	0.53	0.17	**	0.36	0.43		0.15	0.14		227
30-34 years	0.57	0.25	**	0.50	0.46		0.21	0.14		265
35-39 years	0.60	0.16	**	0.50	0.45		0.16	0.17		247
40-44 years	0.64	0.25	**	0.60	0.39	**	0.25	0.10	**	247
Likely with same employer in 12 months	0.58	0.21	**	0.52	0.48		0.20	0.15		791
Unlikely with same employer in 12 months	0.62	0.20	**	0.48	0.30	*	0.25	0.09	*	137
45 years and older										
Men	0.67	0.30	**	0.40	0.40		0.12	0.11		424
Women	0.63	0.24	**	0.56	0.57		0.22	0.17		576
45-49 years	0.66	0.28	**	0.55	0.52		0.20	0.18		357
50-54 years	0.61	0.28	**	0.49	0.51		0.18	0.14		346
55-60 years	0.67	0.23	**	0.42	0.44		0.15	0.13		278
Likely with same employer in 12 months	0.63	0.26	**	0.51	0.52		0.18	0.15		823
Unlikely with same employer in 12 months	0.70	0.30	**	0.53	0.42		0.18	0.18		110

Source: Survey data, own calculations. *) α =0.05, **) α =0.01. N = number of individuals.

6. Conclusion

Receiving a brochure with information about subsidized training and about the importance of life-long learning substantially increased the share of individuals' awareness about the program, by more than 150 percent. Moreover, receiving the brochure significantly increased the participation in training in general in the 7-month period after the randomization, at least among workers aged below 45. Participation in training of older workers was not affected.

We do not find effects of the information treatment on take-up of WeGebAU subsidized training. Obviously this cannot be explained by information deficits about the WeGebAU program's existence. An alternative explanation is that individuals who decide to use WeGebAU may, for personal scheduling reasons, take years before they submit a request and enroll. As long as imminent job changes are not foreseen, it may actually make sense to postpone training, in order to obtain the most up-to-date training contents at the moment it is warranted. Against this explanation one could argue that the information treatment does lead to a short-term increase in other training activities, and that would seem to go against the relevance of this explanation. However, here it should be borne in mind that participation in WeGebAU training requires more steps than participation in other training. The former requires permission by the employer and participation at certified private training providers, whereas other training activities do not necessarily require any of this. For example, employer permission may be postponed until the firm faces some production slack. Indeed, all these obstacles may lead to substitution away from subsidized training towards other types of training. In the end, this suggests that it would be useful to return to these issues with data with a longer observation window after the information treatment.

In the survey data, about 8 percent of the workers reported that they do not want to be subsidized by the FEA. This hints at stigma effects of WeGebAU. But employers may shy away from the program as well, if they assume that an application for subsidies would harm their reputation. Yet another explanation for the low take-up of WeGebAU may be that even with subsidies attached, training might be too costly for firms.

Regarding the absence of effects on any training take-up among 45+ workers we emphasize that this finding may also change if the time since the information treatment is increased beyond the current observation window. Arguably, older workers are more in need of skill upgrading than younger workers, so it may seem paradoxical that their take-up of any kind of training is not at all affected by the information treatment. However, as noted earlier, the information treatment may raise the awareness of the time costs of training more strongly

among older workers. Also, even if the latter is not the case, the time needed to find a suitable training program and the time needed to fit a training period into regular work and family life may be longer for older workers than for younger workers. In addition, older workers change jobs less often than younger workers, so for them it may be particularly attractive to postpone training until imminent job changes are foreseen, in order to obtain the most up-to-date training contents at the moment that it is warranted. The postponement behavior and the low job-to-job transition rate then lead to a slower rate of entering training. All this reinforces the suggestion that in some years from now the data should be enriched to cover a longer observation window and the analyses should accordingly be upgraded.

Our current study does suggest that it makes sense to increase the awareness of training among employees. The provision of additional information on the general benefits of training may remove information frictions and set incentives to participate in training. If the ensuing increase in training is translated into an increase in productivity then this may help to catch up with increasing skill demands in the labor market. In our setting, the fact that employees respond by taking up more training without subsidies, rather than more training with subsidies, makes this strategy particularly interesting.

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Appendix 1: Translated version of the brochure

Further training subsidies for employees
Lifelong learning pays off – participate!

What are the benefits of training?
Taking up training or obtaining a professional degree has many benefits:

- Additional qualifications increase professional competence and help to stay professionally up-to-date.
- Professional training cannot only increase productivity, but also increase job satisfaction.
- New professional knowledge promotes career advancement and thus the earning potential.
- With improved professional skills, you can take-up new challenges with increased self-confidence.

Who is funded and to what extent?
The employment agency supports professional training of employees by a special program called WEGEBAU. The funding is aimed at two target groups.

- Target group 1: Employees who are seeking a (new) professional qualification
- Target group 2: Employees in small and medium-sized enterprises

Within the framework of the special program considerable parts of the further education costs can be reimbursed; remaining costs are usually paid by the employer. The exact conditions are described below.

Target group 1: Subsidies for employees without appropriate professional qualification
You think that a (new) professional qualification would be helpful for your professional advancement? The employment agency promotes the acquirement of a recognized professional qualification for

- employees without a professional qualification.
- employees with a professional qualification, who no longer practice their learned profession for at least four years and have a semi-skilled or unskilled job.

Any incurred training costs can be reimbursed in full. Additional costs for accommodation, travelling or childcare can be subsidized. In addition, your employer can apply for a subsidy to your wage for the time, in which you can't work due to the further education.

Target group 2: Promotion in small and medium-sized enterprises
You are working in a small or medium sized company that is maybe not so active in further education? For employees in small and medium-sized enterprises with less than 250 employees, the employment agency subsidies trainings costs partially: For persons under 45 years 50 percent of the costs will be reimbursed, for people over 45 years even up to 75 percent of the costs will be reimbursed. Additional costs for accommodation, travelling or childcare can be subsidized. Subsidized training should not only be company-specific and should be more than a work-related short-term training.

How do you get funding?
It is important that you talk to your employer about your plans for further education. Your employment agency advises you and your employer if you have questions about the application process. You have two options:

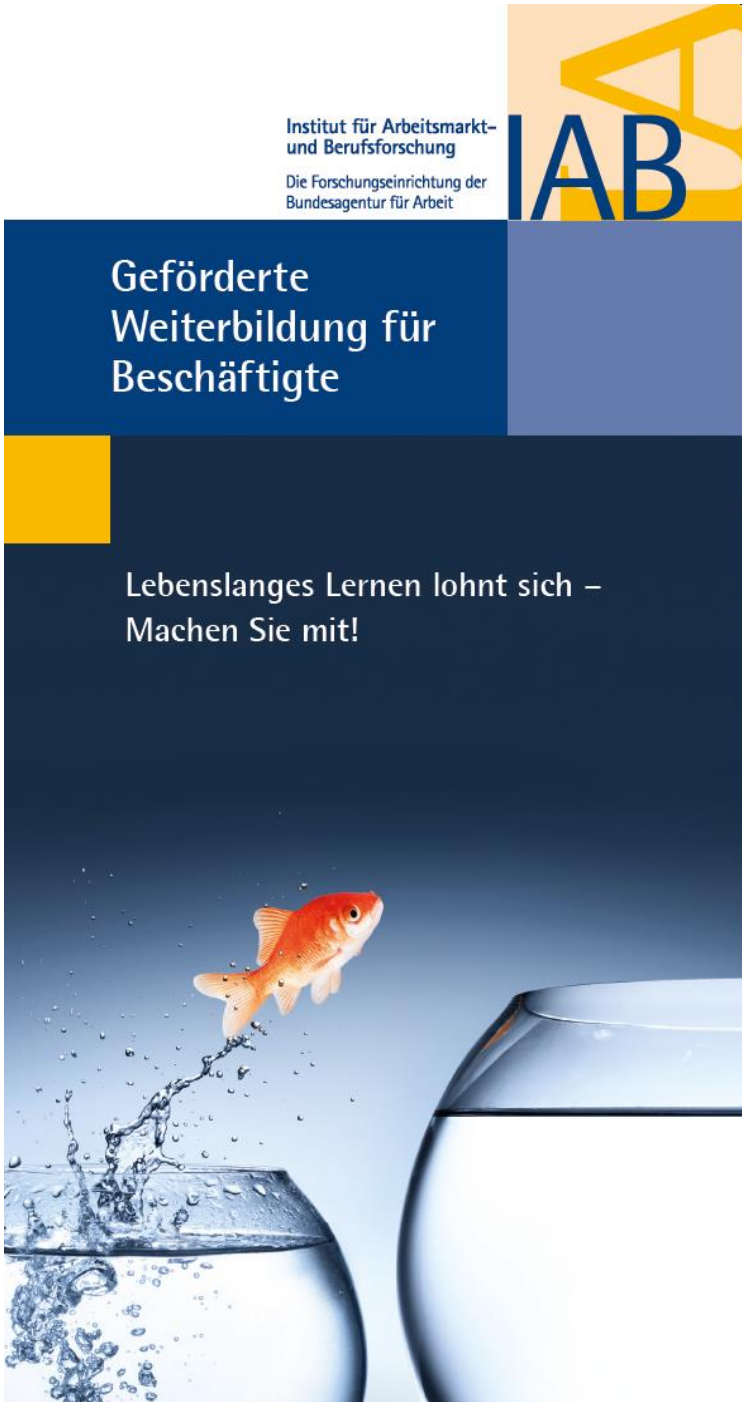
- First talk to your employer about your plans for further education. Your employer receives further information from the employer service of the employment agency (free hotline: 0800 45555-20) *.
- Or directly make an appointment with your employment agency (free hotline: 0800 45555-00) * before you talk to your employer about a possible further education.

Ask for "WEGEBAU".

What are the conditions to obtain a subsidy?
Training costs can be covered by the employment agency for approved training courses and educational institutions. The employment agency can advise you on this.

Where can you get more information?
Further information - also for your employer – can be found at www.iab.de/wegebau. There you will also find a link to KURSNET, the portal for professional education and training from the employment agency. KURSNET offers information about many approved training and qualification opportunities.

First page brochure



Appendix 2: Sample sizes

The sample obtained from the registers (as described in Subsection 4.2) contains 159,121 workers. From this we sample drop some individuals, for the following reasons. First, we drop 3,980 workers for whom we did not have any address information. Next, we drop 417 individuals with missings in the control variables that we use to check for balanced samples. Next, we clear the sample from 3,872 workers receiving welfare benefits, who are not eligible for the subsidy. We further restrict the sample to workers aged 25 to 60 years; this involves dropping an additional 23,271 observations. Finally, we exclude 18,032 low-skilled workers. The remaining sample contained 109,559 workers. Within this sample we identified 10,672 workers aged below 45 and working in SME (cost reimbursement up to 50 percent) with address data that were no older than 2008, and 10,641 workers aged 45 or above and working in SME (cost reimbursement up to 75 percent) with address data no older than 2003. These are the sample sizes at the date of randomization.

After sending out the brochure, we drop 564 workers who had not received the brochure because the address was not valid, had passed away, or refused to participate in the experiment after receipt of the brochure. For example, one worker threatened to sue to FEA if his records would be used for the project. Robustness checks show that our results do not change if we include these 564 into our analysis (thus estimating intention-to-treat effects or controlling for selection on observables).[10] A few additional individuals are lost due to data updates between different versions of IEB data and due to missing information. In rare cases, the personal identifier is ambiguous between different IEB versions, e.g., when the FEA accidentally attributes a new social security identifier to a worker who is already registered in the social security system. By repairing this, the sample increases by 169 workers. We then drop 1 worker who did not have any observed spell in the labor market before the RCT, 894 workers who had no spells after the RCT, 328 (395) workers who were job-seeking (did not have a job) when the RCT took place, and 1 worker who had no firm identifier. This leaves us with a remaining sample of 9,602 younger workers and 9,679 older workers employed at SME.

[10] These results are available on request.