

Do employment subsidies reduce early apprenticeship drop out?*

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23rd March 2012

VERY PRELIMINARY VERSION

Abstract

We evaluate the effect of the Apprenticeship Bonus, an employment subsidy program, on early drop out of apprenticeship. Only school leavers who did not succeed to start apprenticeship training directly after leaving school are eligible for this program. Our analysis is based on rich survey data that has been collected specifically for this study. Using this data, we investigate the selection into the program and analyze the effect of this subsidy on apprenticeship drop out risk. Even though the subsidy provides strong incentives to prevent drop out, we do not find significant effects of the program on early drop out of subsidized apprentices. Our finding suggests that financial incentives are not efficient in increasing the probability to finish vocational in-firm training successfully.

Keywords: Apprenticeship, vocational training, subsidized employment, drop out.

JEL classification: I21, J08, J38.

*This paper is based on the evaluation study 'Effects of the Apprenticeship Bonus on the apprenticeship market and on public finance', which was conducted on behalf of the German Federal Parliament. We gratefully acknowledge the provision of data by the German Federal Employment Agency and the Institute for Employment Research (IAB). We have benefited from discussions in the internal seminar at ZEW and at the ESPE Annual Conference 2011. We are also grateful to Annette Hillerich and Markus Zimmermann for excellent research assistance. Contact address of the authors: Centre for European Economic Research (ZEW), PO Box 103443, D-68034 Mannheim, Germany.

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1 Introduction

In many countries, apprenticeship training plays a major role for skill formation during the school-to-work transition (Ryan [2001]). About two thirds of German school leavers, in particular those with lower graduation, enter the labour market via the apprenticeship system[BMBF, 2010]¹. Finishing apprenticeship training leads to a formal degree that certifies the acquisition of vocational qualification in form of work experience and specific skills. This formal degree serves as a kind of “admission ticket” for later jobs and unemployment rates are much higher for workers that did not finish apprenticeship training successfully. Accordingly, drop out of apprenticeship is likely to affect future career prospects (Winkelmann [1996], Lüdemann et al. [2006], Oreopoulos [2007]). Despite the importance of the apprenticeship degree, drop out rates are fairly high. For example, in Germany more than 20 percent of apprentices drop out before the end of the training (see table 1). Approximately half of the drop outs occur during the first year of apprenticeship training.

Table 1: Drop out rates for apprenticeship training in Germany

	Drop out rate (first year of apprenticeship)	Drop out rate (overall)
2003	0.11	0.24
2004	0.10	0.22
2005	0.10	0.21
2006	0.10	0.21
2007	-	-
2008	0.12	0.23

Source: German Federal Institute for Vocational Education and Training (BiBB). No data available for 2007.

Due to the importance of apprenticeship in Germany, politics concern about apprenticeship seekers and apprenticeship completion. In 2008 the German Federal Government introduced the Apprenticeship Bonus.² The aim of this program is to support disadvantaged young people to find an apprenticeship position and complete apprenticeship training. Young people who unsuccessfully searched for apprenticeship positions after leaving school are eligible for Apprenticeship Bonus.³ The program provides a 4000-6000 Euro subsidy to employers that offer apprenticeship positions to eligible young people. The subsidy provides a conditional payment that is split in two equal parts. The first payment is conditional on apprentice’s survival of the probation period which is typically three to four months after the

¹In 2009 64.8 percent of German school leavers enter the apprenticeship system.

²Apprenticeship Bonus denotes the German program *Ausbildungsbonus*.

³Also young people who cannot finish apprenticeship training because the firm goes bankrupt are eligible for Apprenticeship Bonus. This case is not considered in the following paper.

start of apprenticeship training. The second payment is conditional on the registration of the apprentice for final examination, which is typically two to three months before the end of the training period. Apprenticeship training takes between two and three and a half years.

Private firms play an important role in the German apprenticeship system. They provide most of the vocational training and therefore pay most of the costs. Firms consequently expect a large fraction of the returns from apprenticeship for them. As the German apprenticeship system is a dual track system, apprentices work most of the time in the firm and spend one to two days per week at vocational schools, where they follow specific and general classes. Firms returns to apprenticeship training depend on the productivity of apprentices, the time the apprentices work in the firm and the facility to hire qualified workers at the labour market. Apart from the original hiring decision, profit maximizing firms should decide over the course of apprenticeship training whether to continue apprenticeship training or dismiss the worker by considering their ratio between expected costs and returns.

In this study we investigate two issues: First, we investigate the selection of eligible young workers into the Apprenticeship Bonus. Second, we estimate the effect of participation in the Apprenticeship Bonus on drop out during the first year of apprenticeship training. We compare early drop out rates of apprentices subsidized by Apprenticeship Bonus with comparable, eligible but unsubsidised apprentices.

The subsidy provided by the Apprenticeship Bonus decreases labour costs of entitled apprentices. As the Apprenticeship Bonus is split in two payments that are conditional on the survival of probation period and on the registration of apprentices for final examination, firms *ceteris paribus* have an incentive to prevent subsidized apprentices from dropping out in order to get the payments. If firms react to this incentive, subsidized apprentices should be less likely to drop out than comparable unsubsidized apprentices. Apprenticeship wages are quasi fixed through collective bargaining agreements and the subsidy is paid directly to the firms. Nevertheless, profit maximizing firms can, and usually should, share the rent and provide non-monetary transfers to the subsidized apprentices. To prevent drop out, firms could for example pass on incentives to subsidized apprentices through higher commitment, more patience, concession and encouragement.

The individual decision to quit apprenticeship training has been explained by at least two different theoretical approaches. The first approach emphasizes the importance of imperfect information about the match quality at the start of an employment spell (Jovanovic [1979]). During employment, the employer and the employees gain information about the quality (productivity) of the match. If the match quality turns out to be too low, the employees are dismissed. In the context of apprenticeship training, a mismatch revealing after some time could be responsible for drop out. Second, referring to the classical human capital approach by Becker [1964], drop out of apprenticeship can be associated to changes in the cost-benefit ratio of the educational aspect of apprenticeship. Initially expected returns to apprenticeship

can decrease or expected costs of apprenticeship can increase and ultimately lead to drop out.

We use detailed survey data on apprentices for our analysis of the effect of Apprenticeship Bonus on early drop out. The data contain detailed information on apprentices who are subsidized by Apprenticeship Bonus and apprentices who are eligible but not subsidized. We use a wide range of information on apprentice's characteristics, education, socio-economic and family background. The data also comprise information on apprentice's behavior, activities and decisions between leaving school and start of apprenticeship training. This includes the search strategy in order to find an apprenticeship position between leaving school and starting apprenticeship. We argue that our data validates a selection-on-observables approach to exclude selection effects.

We find that the Apprenticeship Bonus has no significant effect on early drop out risk of subsidized apprentices. The survival rates of subsidized and unsubsidized but eligible apprentices are about the same, twelve months after the start of apprenticeship training. Using propensity score matching, we find no significant effects of Apprenticeship Bonus on dropout rates during the first 12 months after the start of apprenticeship training.

Still, the time pattern of the effect on monthly drop out rates fits to the incentive structure provided by the Apprenticeship Bonus. Estimates of monthly effects show that drop out rates are slightly decreased by the Apprenticeship Bonus during the first four months after the start of apprenticeship. After the fourth month, the Apprenticeship Bonus leads to higher drop out risk. We interpret our findings as a sign of deadweight effects, apparently the Apprenticeship Bonus decreases the drop out rates slightly until the end of the probation period. Once firms have received the first payment of the Apprenticeship Bonus, the drop out rates increase and one year after the start of apprenticeship training, the survival rates with and without the program are roughly the same.

This study is closely related to research on the effect of subsidized employment, drop out of education, and the effect of subsidies on educational attainment. To our knowledge, this is the first study evaluating the effect of subsidises on drop out for apprenticeship training. Different from our study, classical evaluation studies on the effect of subsidies on employment duration or employment probability have a different perspective on the desired outcome. The outcome in these studies is non-subsidized regular employment in contrast to spending time in subsidized employment. Gerfin et al. [2005], Jaenichen and Stephan [2011] and Göbel [2006, 2008] for example examine the impact of subsidized employment on the probability of prospective regular employment, considering subsidized employment as non-desirable. Accordingly, Bell et al. [1999] and Dorsett [2006] evaluate the British program New Deal for Young People with respect to the employability of subsidized youth. In our case, however, the subsidy aims to reduce drop out from apprenticeship training. Staying in employment until the examination is considered as highly desirable as completion of apprenticeship training serves as an important signal to future employers.

Our study shares important traits with the vast literature on the determinants for drop out of schooling, post-compulsory schooling, or apprenticeship training.⁴ Also, there is a branch of literature on the effects of subsidies on educational attainment. Dynarski [2003], for example, evaluates the effects of subsidies on college completion in the US and Dearden et al. [2005] examine the impact of subsidies on retention in post-compulsory schooling in the UK. Specific evaluations on subsidized apprenticeship training, however, are rarely conducted.

This paper is structured as follows: In section 2, we summarize the German apprenticeship system and describe the mechanism of Apprenticeship Bonus regarding drop out risk. The used data set and a descriptive analysis of the characteristics of apprentices that are selected into the Apprenticeship Bonus are presented in section 3. Section 4 discusses the identification strategy referring to potential factors of drop out risk and the selection into Apprenticeship Bonus. We evaluate the effect of the Apprenticeship Bonus on drop out risk in section 5 and conclude in section 6.

2 The German apprenticeship system Apprenticeship Bonus

The German apprenticeship system has a long tradition in training young school leavers to enter the labour market.⁵ Compared to many other countries, Germany faces relatively low unemployment rates for young people and labour market integration of school leavers works well. Therefore, in the economic literature, the German apprenticeship system is often considered as exemplary for other countries (see for example Oulton and Steedman [1994], Steedman [2001], Harhoff and Kane [1997]). The German educational system provides several alternatives to school leavers at the end of compulsory schooling. Apprenticeship training is one important option besides further schooling or the direct entrance to the labour market. About two thirds of German school leavers enter the apprenticeship system⁶, and for most of them, apprenticeship training is a stepping stone into the labour market.

After leaving compulsory school youth can apply at firms for apprenticeship training without further prerequisites. The German apprenticeship system provides dual training that combines in-firm training with schooling. At the end of the apprenticeship training, which lasts between two and three and a half years, there is a central examination for practical and theoretical professional knowledge and skills. For school leavers with low degrees, the apprenticeship system offers an opportunity to get profound professional training. During apprenticeship training young workers acquire vocational qualifications, formal skills, and working experience. On the other hand, non-completion of apprenticeship can hamper future career prospects. For example, Lüdemann et al. [2006] report shorter unemployment dura-

⁴See for example Bessey and Backes-Gellner [2008] for apprenticeship training.

⁵See Franz and Soskice [1995] for an overview. Note that a couple of other Countries, as Switzerland, Austria and Denmark have apprenticeship systems that are very similar to the German system.

⁶In 2009 64.8 percent of German school leavers enter the apprenticeship system BMBF [2010].

tion for workers who successfully finish apprenticeship compared to workers without complete apprenticeship training. Also Winkelmann [1996] finds favorable employment prospects of apprentices regarding the first full-time employment. Recent figures show that 22 percent of workers without vocational are unemployed. In contrast, only seven percent of workers with vocational degree are unemployed (IAB [2011]).

In July 2008, the German Federal Parliament introduced the Apprenticeship Bonus⁷ as a program for disadvantaged young workers. The Apprenticeship Bonus has two main goals: First, to facilitate young people's access to apprenticeship positions and second, to stabilize apprenticeship training for entitled workers. The Apprenticeship Bonus offers a subsidy, paid to the employer for newly hired apprentices under the following conditions: First, the subsidy is only allocated for apprentices who have unsuccessfully searched for apprenticeship training after leaving school. Apprentices have to "prove" that they have unsuccessfully searched for an apprenticeship position. Either they provide evidence that they applied unsuccessfully for an apprenticeship position at least three times, or they are officially registered as "searching for apprenticeship position" at the unemployment office⁸. Besides this *eligibility criterion* on the individual level there is a second *additionality criterion* for the firm. To obtain the subsidy, the provided apprenticeship position has to be "additional". The additionality is legally defined as the number of offered apprenticeship positions which has to be higher than the average number of apprenticeship positions offered during the last three years.⁹

A closer look on the German apprenticeship system is helpful for the evaluation of the Apprenticeship Bonus. In the following we discuss two relevant features of the German apprenticeship system, both stress the importance of private firms.

First, the apprenticeship system provides training in two ways. Formal, theoretical training and general training is mediated by public vocational schools for one to two days per week. The remaining days, the apprentices are trained on the job in private firms. This means that an important part of the training is provided in the firm. In-firm training is applied and mostly firm- and occupation-specific. To start apprenticeship training, people have to apply for an apprenticeship position at the firm. In the course of apprenticeship training apprentices actually work in the firm. The relationship between the apprentice and the firm is therefore comparable to the relationship normal employees have with their employer, apart from the fact that apprentices earn less and spend part of the time at the vocational school. As for regular employment, the match quality between the apprentices and the firm is important for the stability of the position. The duration of apprenticeship training is three years on

⁷The *Ausbildungsbonus* is regulated by § 421r of the German Social Security Code (III).

⁸Apprenticeship Bonus can also be provided for slow learners, socially deprived, or apprentices who suffer from firm closure. This study, however, focuses only workers that did unsuccessfully search for a position after leaving school.

⁹Since many firms fulfill this criterion anyway, it is apparent that this criterion can not ensure that the subsidised apprenticeship position is created as a result of the Apprenticeship Bonus.

average.¹⁰

Firms bear the net cost/benefits of apprenticeship training. As apprentices work during apprenticeship training, they account for a certain part of firms production outcome. However, apprentices are less productive than comparable skilled workers. Studies on net costs of apprenticeship training report a wide range that goes from substantial net benefits to substantial net costs, depending on the sector and occupation. (see Table 73 in Schönfeld et al. [2010]).¹¹ One branch of the literature tackles the question, why some firms offer apprenticeship training when they face substantial costs. For example, Acemoglu and Pischke [1998, 1999] argue that labour market imperfections after the apprenticeship period lead to restricted mobility of workers and therefore allow firms to collect returns of their investments into apprenticeship training.

If firms have market power, the Apprenticeship Bonus enters directly into cost/benefit considerations of firms. The Apprenticeship Bonus lowers the labor costs and hence the net costs of an apprentice. The total amount of the subsidy can be 4,000 €, 5,000 €, or 6,000 € depending on the wage in the first year of specific apprenticeship. With respect to gross labour costs of apprenticeship the amount of subsidy is substantial. Wenzelmann et al. [2009] report that the average labor costs of training per apprentice is about 9,500 €/year . For three years of apprenticeship training, the subsidy reduces labour costs by 18 to 28 percent which is shown in Table 2. Apprenticeship Bonus is divided into two equal payments. The first payment is conditional on the end of probation period which is typically three to four month after start of apprenticeship. The second payment is conditional on the registration of the apprentice for final exams. Registration is typically two to four month before the end of the apprenticeship period.

Table 2: Amount of subsidies by Apprenticeship Bonus with respect to labour costs

amount of subsidy	paid for monthly wages	reduction of labour costs *
4,000 €	< 500 €	> 22 %
5,000 €	500 – 750 €	18 – 28 %
6,000 €	> 750 €	< 22 %

* Average labour costs calculated over an assumed apprenticeship duration of three years.

As the Apprenticeship Bonus is paid conditional on probation and registration for final exams, *ceteris paribus* the subsidy provides an incentive for firms to prevent the entitled

¹⁰Depending on the industry, the level of formal education and the specific contract, the apprenticeship duration can be between 18 and 42 months.

¹¹In fact, overall empirical evidence regarding net costs associated with apprenticeship training is ambiguous. Based on a questionnaire Wolter and Schweri [2002] report varying cost-benefit structures during apprenticeship training for Switzerland. Mohrenweiser and Zwick [2009] find evidence for net costs in German firms only in manufacturing occupations. Schönfeld et al. [2010] also reports substantial net costs mainly in manufacturing occupations.

apprentices from dropping out. Wages during the apprenticeship period are in general fixed by collective agreements. Therefore the subsidy will usually not result in higher wages for the apprentices. Nevertheless, firms have an incentive to pass transfers, e.g. non-monetary ones, to the subsidized apprentice in order to prevent drop out. These non-monetary transfers can comprise for example more guidance, higher commitment, more patience and concessions, more encouragement and support towards the apprentice. If the rent, resulting from the subsidy, is shared between the firm and the apprentice or if the firms do an extra effort in order to receive the subsidy, then the subsidy should prevent drop out from apprenticeship training.

3 Data description

The analysis is based on comprehensive survey data that were specifically collected for this study by telephone interviews, between October and December 2009. The survey was conducted among 4,000 apprentices who have unsuccessfully searched for an apprenticeship position directly at the end of schooling and who have been hired as an apprentice more than one year after leaving school. Contact addresses of these apprentices were randomly drawn from administrative data by the Federal Employment Agency.

Our sample consists of two subgroups: A treatment group of 800 apprentices who are subsidized by Apprenticeship Bonus. These apprentices are all participants of the program. A comparison group consists of 3,200 eligible but unsubsidised apprentices. These non-participants have all been unsuccessfully searching for apprenticeship training after the end of schooling and are therefore eligible for the program.¹² Participants and non-participants likewise started their apprenticeship in fall 2008, typically in September. Our sample of apprentices allows to compute results for the population of German apprentices who were unsuccessfully searching an apprenticeship position after schooling and found an apprenticeship position only later.

For our analysis, the central outcome variable is drop out of apprenticeship. Since we observe the individual drop out date, our data allows us to construct the fraction of apprentices who dropped out in each month since apprenticeship started. Since we do not observe apprentices over the whole course of their apprenticeship, we concentrate on early drop out risk.

Our data contain a large set of control variables on current apprenticeship as well as the socio-economic and educational background of the apprentices. Additionally, the data comprises detailed information on search behaviour of apprentices for the time between leaving

¹²The data were drawn from the population with respect to selected stratification variables: gender, migration status, firm size, and region. All results in this study are weighted in order to obtain results for the underlying population.

school and entering apprenticeship training, which also comprises biographical information for this period.

In order to understand, if the participants of Apprenticeship Bonus are actually disadvantaged, it is useful to describe participants in Apprenticeship Bonus. Our data allows us to compare participants in Apprenticeship Bonus with eligible non-participants. This provides insights into the selection process. In the following, we look into the differences in means between characteristics of participants and eligible non-participants.

In summary, we find some differences between the group of subsidized apprentices and the comparison group with respect to their educational and socioeconomical characteristics and their search behaviour. We find significant differences in variables which might have an impact on early drop out of apprenticeship as an outcome. These differences, however, depict a mixed picture of selection into Apprenticeship Bonus. The differences do not suggest that one group is generally more disadvantaged than the other and we do not find a clear selection pattern concerning participation in Apprenticeship Bonus and drop out risk.

The following three cases summarize the situation with respect to selection into Apprenticeship Bonus. Firstly, for some characteristics we find no differences between subsidized and unsubsidized apprentices. Secondly, our data contain variables which differ across the groups of subsidized and unsubsidized apprentices and which are expected to be relevant for early drop out. However, for some variables it is not clear whether high or low values of these variables indicate that the apprentice is disadvantaged. Thirdly, some characteristics are approximated by a set of similar variables. These variables significantly differ across the groups of subsidized and unsubsidized apprentices. In sum however, the values of these variables do not clearly indicate one group as more disadvantaged than the other. In the following we present one important example for each of the three cases. For detailed statistics on the subsidized apprentices and the comparison group refer to table 4.

A question is, why the apprentices did not start apprenticeship after the end of schooling. The comparison of means between subsidized and unsubsidized apprentices in our sample shows no significant differences: About the same share of apprentices in the treatment and the comparison group stated their applications were not successful (42 percent compared to 40 percent). Participants as well as non-participants provide virtually the same explanations for this: another applicant was favoured, grades were not good enough, or being too late with their applications.

Another reason why past applications were not successful could be less search effort and some school leavers might simply put less or no effort in the search for an apprenticeship position. Our data contain information on the number of applications and the number of invitations to job interviews before school leavers found an apprenticeship position. The number of applications and job interviews can also reflect the motivation of school leavers to find a position. We find differences between subsidized and unsubsidized apprentices with respect to

both the number of applications and the number of job interviews. On average subsidized apprentices report 35.6 applications. Unsubsidized apprentices have written significantly more applications (42.1). On the other hand, the average number of invitations for job interviews is significantly lower for subsidized apprentices (5.9 job interviews compared to 6.7). However, it is not clear whether these differences translate into higher or lower drop out rates for one group or the other. .

Thirdly, our data contain variables on secondary education. On average, we find significantly more subsidized apprentices with a lower secondary degree (53 percent compared to 34 percent)¹³. The share of subsidized apprentices with a middle or upper secondary degree is significantly lower, respectively (37 percent to 42 percent with a middle secondary degree and 7 percent to 21 percent with a upper secondary degree). We conclude that subsidized apprentices have on average a lower degree as apprentices in the comparison group. Besides the degree we also have measures of school performance for the last school year, measured by grades. Subsidized apprentices have on average worse grades in German (3.03 compared to 2.90)¹⁴. On the other hand, we do not find a significant difference in Maths grades between subsidized apprentices and the comparison group. Overall, our measures on school performance do not provide clear evidence for one group being more disadvantaged than the other.

Selection into Apprenticeship Bonus could also be visible in differences in the chosen professional occupation of participants and non-participants. As we stated in section 2 costs of apprenticeship differ substantially across occupations. Thus, it could be that the likelihood to receive Apprenticeship Bonus varies across professional occupations. We compare the most frequent occupations chosen among the groups of subsidized and unsubsidized apprentices. Table 6 shows no statistical differences between the treatment and comparison group. Despite some changing order we find the same occupations among the five most chosen occupations in both groups. In addition, there is no particular concentration on a certain occupation within both groups and the shares of each occupation within participants and eligible non-participants are similar. Application of Apprenticeship Bonus seems not to be a matter of occupation.

4 Identification strategy

In order to estimate the effect of the Apprenticeship Bonus on drop out risk we use a selection on observables approach. This approach relies on the conditional independence assumption (CIA). All factors that have an influence on both the participation in Apprenticeship Bonus and the drop out risk need to be available in order to compute unbiased estimates of the

¹³Lower secondary” degree equals nine or ten years of schooling.

¹⁴The German school grade system is represented by a scale reaching from 1 (very good) to 6 (unsatisfactory).

effect of Apprenticeship Bonus. In the following, we argue that in this study, the available information in our data justifies our identification strategy. Most notably, we have a large set of variables that proxies important characteristics such as motivation, effort, and relevant biographical information for young labour market entrants, which is often not available for researchers.

As we have seen in the previous chapter, there are some significant differences between participants and non-participants, but it is hard to discover a clear-cut selection pattern. The remainder of the chapter discusses factors which might have an impact on drop out risk. We derive from the estimated propensity score model, whether these factors are relevant with respect to the CIA because they have an effect on selection besides outcome.

We argue that the stability of apprenticeship training is linked to the quality of match between the employer and the apprentice. The concept of job match quality refers to a study from Jovanovic [1979] which can be applied as a rationale in our case. The model assumes two-sided information imperfection. At job entrance, both the worker and the firm do not know how well the worker's productivity fits to the position. New information about the current match or potential alternatives arrive during the employment which could lead to a quit or lay-off. In our context, a mismatch would reveal after some time of apprenticeship duration and can therefore be responsible for a decision to drop out.

There is also a close reference to the standard human capital model from Becker [1964]. Drop out of education or respectively drop out of apprenticeship can occur due a change in the ratio of expected returns to education in comparison to associated costs. In our case, individual expected returns could turn lower than costs during apprenticeship and thus lead to drop out. In this respect, Bradley and Lenton [2007] mention three possible reasons for drop out of post-compulsory education which can also be considered in the case of apprenticeship. First, apprentices could perceive that they have reached their optimal amount of education. Second, apprentices could have underestimated costs associated with apprenticeship, or could have overestimated their returns to apprenticeship. Third, drop out could also arise from non-pecuniar costs for example psychic or social problems.

In order to identify factors which might have an impact on drop out of apprenticeship, we refer to the existing literature on determinants of drop out. We particularly refer to literature which considers apprenticeship in a German or a similar context albeit this literature is scarce. Literature on drop out of post-compulsory education might also be relevant and is partly considered, because apprentices and these students are in the same period of life although students do not yet participate at the labour market.

Schöngen [2003] and Stalder and Schmid [2006] have studied reasons for drop out of apprenticeship in Germany and Switzerland. Their survey data indicate reasons for drop out of apprenticeships to be either firm-related or occupation-related. Important reasons for drop out are conflicts with supervisors or seniors or inadequate choice of occupation. Furthermore,

problems with the family or health problems were stated. Trainers report that unsatisfactory accomplishment or effort at work and at occupational schools are important reasons for drop out.

Bessey and Backes-Gellner [2008] analyze the determinants of drop out of apprenticeship in Germany. Applying hazard rate models, they find cost-related factors to be relevant for drop out. The experience of financial distress or opportunity costs - measured as the ratio of apprenticeship wages to wages of unskilled workers - increase the propensity of drop out.

Various studies on apprenticeship and post-compulsory education stress the importance of prior educational attainment or ability (recent examples are Bessey and Backes-Gellner [2008], Bilginsoy [2007], Mangan and Trendle [2008], Bradley and Lenton [2007]). A higher level of previous schooling leads to a lower propensity of dropping out. This reflects the general fact that better educated workers are less likely to drop out of training because their cost-benefit ratio concerning their returns to education is more promising.

We find evidence for relevance of ethnic or migrational factors explaining drop out decisions in studies from the US or the UK. Bradley and Lenton [2007] for example find that youth with an ethnic minority background are less likely to drop out of post-compulsory education.

Effects of socio-economic background on the propensity to drop out has been reported for post-compulsory education in the US and UK. Bradley and Lenton [2007] for example show that youth who live in social housing - which indicates a low household income - are more likely to drop out. Related to this aspect, the study reveals that parental occupation also matters for the propensity to drop out. Youth with parents in professional or managerial occupations are less likely to drop out which may reflect an income or at least a taste-for-education effect.

There is some evidence that drop out is related to the state of the regional labour market. According to Card and Lemieux [2001], higher regional unemployment rates lead to a decrease of drop out rates from high school. Bessey and Backes-Gellner [2008] however do not find a significant effect of regional unemployment rates on drop out of apprenticeship.

Based on the existing literature on determinants for drop out of apprenticeship from a theoretical and empirical view we control for following factors in our study:

Individual characteristics and socio-economic background We control for the common individual characteristics such as gender, age in years and migrational status. Moreover, we have a broad indicator for the region - West versus East Germany. These factors have a significant influence on the propensity to participate in Apprenticeship Bonus¹⁵.

We consider several factors which reflect the socio-economic background of apprentices. These factors are a proxy for the youths' social skills which could be a prediction for stability in working life during apprenticeship. The variables describe whether the apprentice lives to-

¹⁵Significance of gender and the regional indicator is due the stratification of our sample on the base of these factors.

gether with his or her parents or other persons, whether apprentices have any social problems or receive social benefits. Together with the information on health, psychological or addiction problems these factors are likely to lead to higher drop out propensity. The socio-economic background is also relevant for the probability to participate in Apprenticeship Bonus. Disabled apprentices are less likely to participate. Also, apprentices who care for sick or old family members are less likely to participate in Apprenticeship Bonus.

Further factors describe the situation concerning the parental background and the parents' possibilities to support their children. First, the parents' educational degree is reported. Apprentices whose father has no degree have a significant lower propensity to participate in Apprenticeship Bonus compared to a apprentices whose father has a middle school degree. A further variable depicts the parental involvement in schooling - showing up regularly at parent-teacher conferences - representing the parents' support concerning their children's education. As a proxy this could also reflect the parents' impact on completion of apprenticeship, as young apprentices starting at the age of 15 with their apprenticeship might still be influenced or under the authority of their parents. Apprentices whose parents have shown up regularly at parent-teacher conferences are significantly less likely participants of Apprenticeship Bonus.

Education We furthermore consider former education a relevant factor related to stability of apprenticeship. An apprenticeship position can be depicted as a match between an employer and the apprentice. One important dimension of the quality of the match is to meet the cognitive skill requirements of the employer. In a situation with a worse quality of match, where the apprentice can not fully meet the employer's demand, drop out is more likely. Motivation to drop out apprenticeship could then arise from both the apprentice and the employer. The data contains the apprentices' school degrees as well as their recent grades in mathematics and German. Educational attainment also matters for participation in Apprenticeship Bonus. Apprentices with a lower secondary school degree are significantly more likely where as apprentices with higher secondary school degree are less likely to participate in Apprenticeship Bonus compared to apprentices with an intermediate secondary school degree.

Search strategy and search effort Search strategy and search effort might matter for drop out risk referring to the match quality approach by Jovanovic [1979]. If the applicant's search strategy is thorough he might find a position with a better match quality than otherwise.

Besides, an apprentice's internship previous to his or her apprenticeship at the same employer could reveal match quality - for example in having more information on the occupation - in advance and therefore lead to lower drop out risk.

We have information both on the apprentices' general search strategy after leaving school, the applied search strategies and intensities and by which search channel they have found

their apprenticeship position.

The applicant's search strategy and search effort finding an apprenticeship position is also a factor explaining selection into Apprenticeship Bonus. Applicants who used the employment agency as a search channel are less likely to participate in Apprenticeship Bonus thereafter. Furthermore, applicants who state that they were approached by employers to start an apprenticeship at their establishment are more likely to participate. Selection into treatment is also more likely, if apprentices interned in advance at that specific establishment they start their apprenticeship training afterwards.

Apprentices' search effort could reflect their ability as well as their motivation. These are factors which are usually not observed in a economic analysis but are highly suspected to influence common labour market outcomes. We measure search effort by the number of applications and job interviews between leaving school and starting an apprenticeship. In our case, search effort could influence apprenticeship drop out through three channels. First, the number of applications and job interviews could reflect the motivation and commitment of the apprentice. Motivated and committed apprentices in turn are less likely to drop out. Second, a high number of applications and job interviews could indicate a thorough search strategy ending up in a good match quality between the apprentice and the employer. Third, a high number of applications and job interviews could also be a signal for a previous high rejection rate and hence lower qualification of the applicant and his or her lower occupation specific ability. Low qualified apprentices might decide to drop out of apprenticeship when they do not meet skill demands of the employer and therefore would face problems with completing apprenticeship. According to our propensity score model, however, search effort does not significantly matter for selection into Apprenticeship Bonus.

Biography between school and apprenticeship Labour market activities between leaving school and start of apprenticeship could generally reflect apprentices' motivation as well as their labour market experience which in turn could lead to stability of apprenticeship. Labour market experience and other activities could have impact on drop out risk by influencing match quality. More experienced applicants could be better able to appraise the position they are offered. Thus from individual's perspective uncertainty about the match quality could be lower. Bad matches which lead to higher drop out risk are then less likely. Applicants who have been travelling after the end of schooling or had been inactive (leisure) could also be more motivated and determined to complete their apprenticeship leading presumably to lower drop out rates. Further schooling, for example, could also signal high motivation directed to educational attainment.

We also directly asked apprentices for their reasons not to apply for an apprenticeship immediately after leaving school. The reasons reflect motivation of young school leavers as well as their preparedness for working life. Youth who stated that they had not intended to

work after leaving school are more likely being treated. On the other hand, those who resume going to school are likely to enter Apprenticeship Bonus.

Concerning the robustness of our a result we have to reflect any sources of selection we have not considered yet. This selection factors are only relevant if they at the same time have an impact on drop out risk. We are confident that we have left no relevant factors on individual level unconsidered which could bias our results.

Our data contain detailed information on individual labour market experience as well as other activities like travelling, leisure and military service or compulsory community service. Young workers that have jobbed between leaving school and start of apprenticeship are likely to participate in Apprenticeship Bonus. We find also that certain government provided training measures which prepare school leavers for a vocational career have significant influence on the likelihood of being treated by Apprenticeship Bonus.

5 The Effect of Apprenticeship Bonus on early apprenticeship drop out

We evaluate the impact of Apprenticeship Bonus on early drop out risk for apprentices. Table 8 presents different reasons for drop out which are reported in our sample by subsidized and unsubsidized apprentices who dropped out of appentriceship. There are virtually no significant differences in the importance of any reason to drop out between subsidized and unsubsidized apprentices. The two most important reasons for drop out are that the occupation did not meet the expectations of the apprentices and that they had personal problems with their colleagues or supervisors. Other important reasons for drop out are unfavorable working times or low earnings. Apprentices also report that they have missed the support of their employer, that they have no interest in the apprenticeship they had started, and that they have had health problems which are related to apprenticeship. Many of the reasons for drop out are due to information which is not fully available at the beginning of apprenticeship but becomes available during apprenticeship.

We argue in section 1 that *ceteris paribus* apprentices which are subsidized by Apprenticeship Bonus should be less likely to drop out. This follows from the fact that firms have an incentive to prevent apprentices from dropping out as they only receive the subsidy in the course of apprenticeship, the first payment conditional on survival of probation and the second payment conditional on enrolment for the final exams towards the end of apprenticeship training. The descriptives in 7 indeed show that drop out due to the firm's decision occurs less frequently among the group of subsidized apprentices. 22 percent of the subsidized apprentices state that the firm dissolved the apprenticeship contract. This is a significantly lower share than the one among the comparison group where 32 percent report that drop out

occurs due to the firm’s decision.

As a measure for the drop out risk we use apprenticeship drop out rates for every month t since start of apprenticeship training. Our data contain information on the fraction of apprentices who dropped out until month t since their apprenticeship has started. We study early drop out rates between the first and the twelfth month since start of apprenticeship¹⁶. This allows us to analyze the impact of the first payment of Apprenticeship Bonus, which takes place at the end of probation, typically three month after the start of apprenticeship training, on drop out risk.

Figure 1 shows Kaplan-Meier survivor functions for the first twelve months after the start of apprenticeship training. During the whole period unconditional survival rates for subsidized apprentices are higher than those for the comparison group. For every month since start of apprenticeship there is a higher share among the subsidized apprentices who remains in apprenticeship compared to the unsubsidised apprentices. In particular, the fraction of drop outs from the second to the third month is notably higher among the unsubsidized apprentices. This is in line with the argument that subsidized firms *ceteris paribus* have an incentive to prevent drop outs, if only until the first payment takes place which is after three months. For the months after the first payment took place, we observe rather higher drop rates for subsidized apprentices drop out rates compared to unsubsidized apprentices. In this period the Apprenticeship Bonus provides no payment and the second payment is still far-off. As a cause the incentive to prevent drop out diminishes. After twelve months 15 percent of apprentices dropped out of apprenticeship irrespective whether they are subsidized by Apprenticeship Bonus or not.

As we are interested in the causal effect of participation in the Apprenticeship Bonus, we compute the average treatment effect on the treated (ATT) [compare Rubin, 1974]

$$\Delta_{ATT} = E(Y^1|X, D = 1) - E(Y^0|X, D = 1). \quad (1)$$

Apprentices can be in two treatment states: Either $D = 1$ if the apprentice participate in the Apprenticeship Bonus, or $D = 0$ if the apprentice does not participate. Accordingly, Y^1 denotes the outcome for subsidized apprentices (participants) and Y^0 denotes the outcome for unsubsidized apprentices (non-participants). Equation 1 defines the average treatment effect on the treated as the difference between the average outcome of apprentices who have participated in Apprenticeship Bonus and their average outcome if they had not participated in the program. The second term in equation 1 is a counterfactual term and therefore not observed.

We estimate the counterfactual term using the observable average outcome of the unsubsidized apprentices $E(Y^0|X, D = 0)$. This Assuming independence between participation

¹⁶Data on late drop out is not available for this study.

Table 3: Summary on the distribution of the standardized bias before and after matching

	before matching	after matching
median	4.535	1.106
mean	6.483	1.379
std. dev.	6.440	1.217
pseudo R2	0.145	0.009
LR chi2	566.790	18.810
p>chi2	0.000	1.000

Computation of the standardized bias following Rosenbaum and Rubin [1985].

in Apprenticeship Bonus and the outcome for unsubsidized apprentices Y^0 conditional on observable characteristics X ¹⁷, ¹⁸.

Instead of the vector of different observable characteristics X , we use the one-dimensional propensity score measure to assume independence between participation and Y^0 Rosenbaum and Rubin [1983]. The propensity score provides an one-dimensional measure of the conditional probability of treatment participation, in our case participation in Apprenticeship Bonus.

We apply a kernel density matching estimator with an Epanechnikov kernel.

Applying propensity score matching balances our covariates. After matching there are no significant differences in means for our covariates between the group of treated and untreated apprentices. Table 3 provides summary statistics on covariate balancing before and after matching.

We construct the outcome as a binary variable, taking on the value 1 if the apprentice has dropped out until t , and 0 otherwise:

$$Y_t^d = \begin{cases} 1, & \text{if dropped out of apprenticeship until } t \\ 0, & \text{if still in apprenticeship in } t \end{cases} \quad (2)$$

with $d \in (0, 1)$ and $t \in [1, 12]$ months since the start of apprenticeship training. Therefore, a negative average treatment effect on the treated (ATT) indicates a favourable impact of Apprenticeship Bonus on drop out risk.

Based on our propensity score, we estimate the ATT on the outcome for the first twelve months of apprenticeship as in equation 1. Figure 4 presents monthly point estimates of the ATT.

All point estimates are insignificant. Thus, Apprenticeship Bonus has no significant effect on early apprenticeship drop out risk. Estimates are negative in the first four months, and turn positive afterwards. This suggests that until the duration of four month after start

¹⁷This weaker version of the usual conditional independence assumption, which requires independence between participation and the outcome of both the participants and the non-participants, is sufficient as we estimate treatment effects on the treated.

¹⁸This assumption implies conditional mean independence $E(Y^0|X, D = 1) = E(Y^0|X, D = 0)$.

of apprenticeship there is a favourable impact of Apprenticeship Bonus on drop out risk. Thereafter its impact turns negative.

One might be concerned that not all factors which might influence both selection into Apprenticeship Bonus and drop out risk are considered. For example, factors on the firm level which we can not observe could have an influence on drop out risk. As shown above, there are no differences in the chosen occupations among participants and among non-participants. This indicates that occupational and therefore sectoral aspects are not relevant for selection into Apprenticeship Bonus. We argue that, if there still exists an unobserved selection on the firm level then we face a positive selection of firms regarding drop out risk. As stated above, firms that participate in the Apprenticeship Bonus have to meet an *additionality criterion*. The position of the subsidized apprentice has to be additional in that the current sum of offered apprenticeship position has to be more than the average amount of apprenticeship positions offered during the last three years. The fact that firms meet this criterion indicates a rather good economic situation. These firms are ceteris paribus abler to invest in apprentices and to stabilize them during apprenticeship. Assuming this reasoning our results can be seen as a upper bound measurement of the effect of the Apprenticeship Bonus on drop out risk. We can therefore conclude that Apprenticeship Bonus at the most has no effects on early drop out risk. One could not imagine that Apprenticeship Bonus has strong negative effects. Following then concerns regarding unobserved selection even underlines our results that there are no positive effects of Apprenticeship Bonus on early drop out risk.

6 Concluding remarks and policy implications

In this study we first investigate the selection of eligible young workers into the Apprenticeship Bonus. Secondly, we study the effects of the Apprenticeship Bonus on early apprenticeship drop out risk. The aim of the program is to support disadvantaged young people to find an apprenticeship position and to complete apprenticeship training. Young people who unsuccessfully searched for apprenticeship positions after leaving school are eligible for Apprenticeship Bonus. The program provides a subsidy to employers who hire eligible apprentices. The subsidy is equally split in two parts. One part is paid after completing the probation period and the other part is paid after apprentice's registration for final examination.

The subsidy provided by the Apprenticeship Bonus enters the cost-benefit considerations of firms for entitled apprentices. As the Apprenticeship Bonus is split into two payments over the course of apprenticeship training, firms ceteris paribus have an incentive to prevent subsidized apprentices from dropping out during their apprenticeship. Even though apprenticeship wages are quasi fixed through collective bargaining agreements and the subsidy is paid directly to the firm, we argue that incentives from the subsidy are passed to the subsidized apprentices. Profit maximizing firms share the rent and provide non-monetary transfers

to the subsidized apprentices in terms of commitment, patience, concession and encouragement. Subsidized apprentices should therefore be less likely to drop out than comparable unsubsidized apprentices.

We use data from the evaluation of the Apprenticeship Bonus conducted for the Federal Ministry of Labor. The data contain information on apprentices who are subsidized by Apprenticeship Bonus and apprentices who are eligible but not subsidized. The data comprise comprehensive information on the apprentices' characteristics, education, socio-economic and family background. It covers also biographical information on activities and decisions concerning education and labor market between leaving school and the start of apprenticeship training. We do observe variables which are closely related to characteristics that are normally not available for researchers such as motivation, search effort. For the estimation of the effects of Apprenticeship Bonus we therefore rely on our data and apply a selection-on-observables approach.

We estimate the effect of the Apprenticeship Bonus on drop out risk for the first twelve months after the start of apprenticeship training. The pattern of the monthly treatment effects is in line with the incentive structure of the subsidy. During probation, the effect on drop out is negative which means the subsidy points to a prevention of drop out in this period. Afterwards, the effect turns positive. However, all point estimates are insignificant. Therefore we conclude, that Apprenticeship Bonus has no effect on early drop out of apprenticeship.

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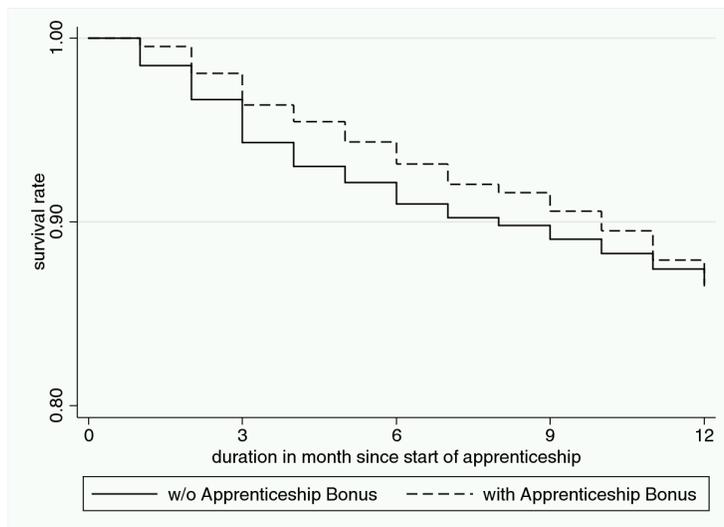
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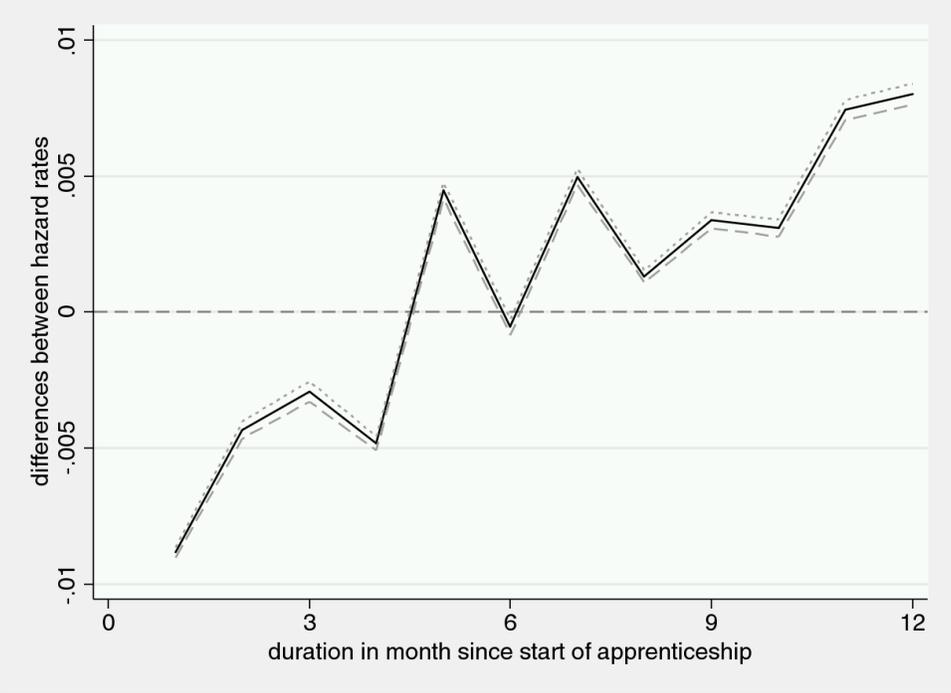
Figures and tables

Figure 1: Survival rates in apprenticeship of apprentices with and without Apprenticeship Bonus



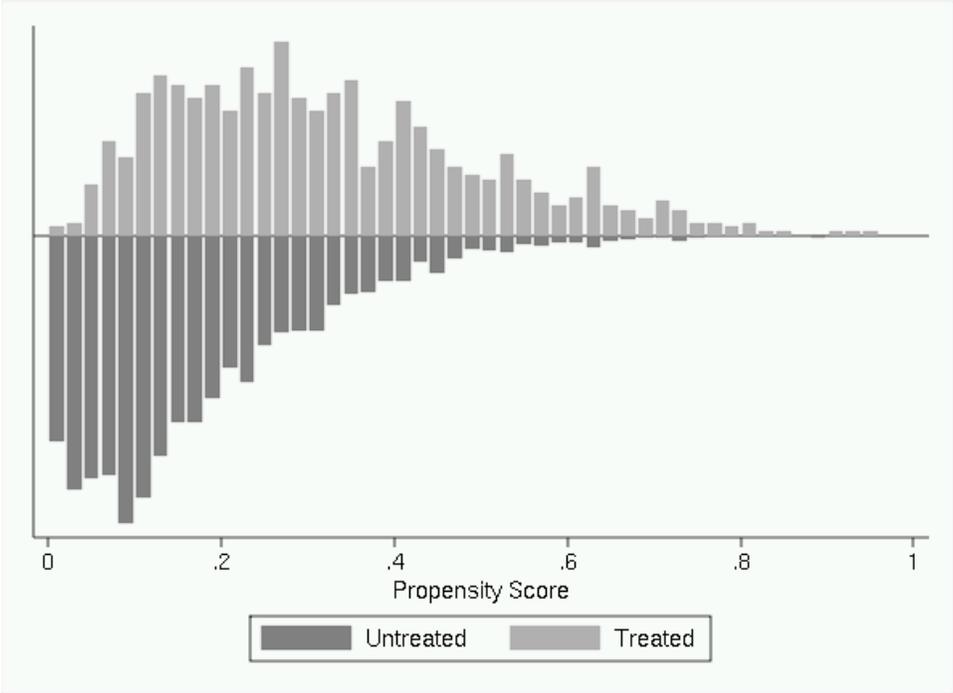
Note: The graph depicts survival rates in apprenticeship for every month since apprenticeship has started. The survival rates are estimated Kaplan-Meier survivor functions. The solid line shows survival rates for apprentices without Apprenticeship Bonus. The dashed line shows survival rates for apprentices with Apprenticeship Bonus.

Figure 2: Difference between drop out rates of apprentices with and without Apprenticeship Bonus; 95% confidence intervals.



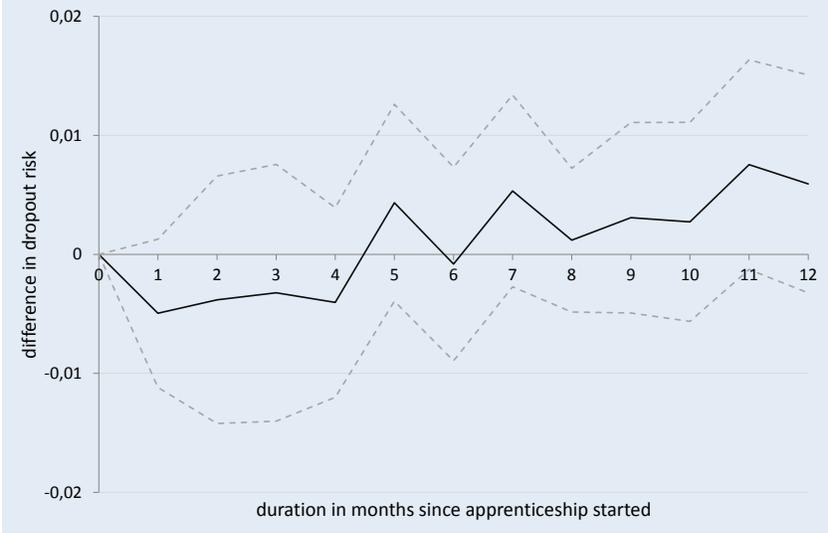
Note: The graph depicts the differences in hazard rates between apprentices with and without Apprenticeship Bonus. The solid line shows the estimates the difference hazard rates framed by a 95% confidence interval.

Figure 3: Different distributions of estimated propensity scores for apprentices with and without Apprenticeship Bonus



Note: The graph depicts from the centre line upwards the histogram of propensity scores for apprentices with Apprentices Bonus. The graph depicts from the centre line downwards the histogram of propensity scores for apprentices without Apprentices Bonus.

Figure 4: Effect of Apprenticeship Bonus on drop out rates (average treatment effect on the treated)



Note: 95% confidence intervals, bootstrapped with 500 replications.

Table 4: Differences in mean between participants and non-participants

	mean value partici- pants	mean value non- participants	t-values
educational, social, and economic background			
secondary education			
lower secondary degree	0.53	0.34	9.95
intermediate secondary degree	0.37	0.42	-2.43
higher secondary degree	0.07	0.21	-12.82
German grade	3.03	2.90	3.68
Maths grade	3.03	3.05	-0.55
socio-economic and family background differences			
disability	0.01	0.03	-4.03
migration background	0.12	0.09	2.25
financial problems or debts	0.14	0.10	2.70
psychological or addiction problems	0.05	0.06	-2.10
recipients of social benefits	0.17	0.15	1.12
having a boy-/girlfriend	0.33	0.32	0.50
living with parents	0.74	0.74	0.15
search strategy			
number of applications	35.56	42.05	-2.88
number of job interviews	5.900	6.700	-2.18
job search channels			
newspaper advertisement/internet	0.770	0.810	-2.64
contact to former employer	0.550	0.480	3.62
inquiry at the employment agency	0.790	0.870	-4.90
job fairs	0.340	0.390	-2.76
employer offered position	0.450	0.340	5.84
labour market status after three months			
in initial apprenticeship	0.980	0.960	2.43
jobbing/new apprenticeship/internship	0.000	0.000	-0.37
jobless, seeking work	0.010	0.020	-0.96
further training, military/alternative service	0.000	0.010	-1.65
exit from labour market	0.000	0.010	-2.45
labour market status after six months			
in initial apprenticeship	0.940	0.920	2.09
jobbing/new apprenticeship/internship	0.000	0.010	-2.60
jobless, seeking work	0.040	0.040	-0.76
further training, military/alternative service	0.020	0.020	-0.83
exit from labour market	0.010	0.010	-1.20

Differences (continued)

	mean value partici- pants	mean value non- participants	t-values
labour market status after twelve months			
in initial apprenticeship	0.880	0.870	0.27
jobbing/apprentice/internship	0.030	0.030	-0.54
jobless, seeking work	0.070	0.050	1.59
further training, military/alternative	0.020	0.020	-1.50
service			
exit from labour market	0.010	0.020	-1.59
biography since leaving school			
time between school and	32.05	27.61	4.16
apprenticeship (months)			
further schooling/evening classes	0.090	0.060	2.73
vocational school	0.400	0.340	2.80
basic vocational education year (BGJ)	0.220	0.120	5.85
job preparing year (BVJ)	0.210	0.200	0.50
basic training (EQ/EQJ)	0.170	0.160	0.87
job preparing training (BvB)	0.250	0.290	-2.38
job application training	0.330	0.290	2.17
occupational orientation course	0.110	0.120	-0.75
language course	0.010	0.030	-3.96
temporary extra job (employment	0.060	0.050	0.88
agency)			
other measures provided by	0.030	0.020	0.40
employment agency			
longer internship (several weeks)	0.510	0.490	1.41
shorter internship (several days)	0.400	0.340	3.08
started different apprenticeship	0.230	0.240	-0.43
jobbing	0.490	0.440	2.36
military or compulsory community	0.090	0.100	-1.31
service			
volunteer work	0.040	0.050	-1.43
more than 4 weeks vacation	0.180	0.180	-0.09
more than 4 weeks abroad	0.070	0.060	0.06
done nothing for a while	0.450	0.450	-0.24
searched for	0.770	0.780	-0.45
apprenticeship/employment			

Note: Column one depicts mean values among subsidized apprentices, column two depicts mean values among still eligible but unsubsidised apprentices. We conduct a two-sample mean-comparison test. The third column shows the respective t-values.

Table 6: Most frequent occupations chosen among participants and non-participants

rank	occupations among participants	percentage share	occupations among non-participants	percentage share
1	office clerk	7.8%	merchant	7.3%
2	merchant	7.6%	office clerk	6.5%
3	hairdresser	5.8%	salesperson	5.5%
4	salesperson	4.9%	motor car technician	3.5%
5	motor car technician	4.5%	hairdresser	3.3%

Note: Columns two and four show the ranked occupations among participants and non-participants. Columns three and five show the respective shares of these occupations within the group of participants or non-participants.

Table 7: Initiative to drop out of apprenticeship

Initiation to drop out of apprenticeship by ...	mean value participants	mean value non-participants	t-value
the apprentice	46%	46%	0.09
the firm	22%	32%	-2.58
both in mutual consent	17%	15%	0.56
firm closure	9%	5%	1.92
The apprenticeship was not aborted, but finished.	1%	1%	0.29
did not answer	5%	1%	
	100%	100%	

Note: Column one depicts mean values among subsidized apprentices, column two depicts mean values among still eligible but unsubsidised apprentices. We conduct a two-sample mean-comparison test. The third column shows the respective t-values.

Table 8: Reasons for drop out of apprenticeship

	mean value partici- pants	mean value non- participants	t-value
general conditions			
unfavorable location of apprenticeship	5%	7%	-0.7
unfavorable working hours	12%	6%	1.4
wage too low	3%	11%	-2.94
lack of support by the firm	9%	6%	0.91
personal preferences			
no interest in apprenticeship	8%	7%	0.14
occupation did not meet expectations	18%	18%	0.11
conflicts with colleagues/supervisor found or prospective different job/apprenticeship/ treatment	34%	23%	1.68
other personal reasons	3%	7%	-1.5
	5%	4%	0.44
health			
health problems due to apprenticeship	12%	6%	1.47
health problems unrelated to apprenticeship	1%	8%	-3.41
own accomplishments			
apprenticeship was too easy/difficult	2%	5%	-1.33

Note: Column one depicts mean values among subsidized apprentices, column two depicts mean values among still eligible but unsubsidised apprentices. We conduct a two-sample mean-comparison test. The third column shows the respective t-values.

Table 9: Balancing test of matching estimation

variable	group	mean		%bias	% red. bias	t-test	
		treated	control			t	p > t
female	unmatched	0.370	0.367	0.60		0.16	0.870
	matched	0.370	0.377	-1.40	-120.00	-0.28	0.776
East Germany	unmatched	0.185	0.188	-0.80		-0.20	0.840
	matched	0.185	0.198	-3.20	-300.00	-0.64	0.525
not German	unmatched	0.185	0.186	-0.20		-0.06	0.951
	matched	0.185	0.198	-3.20	-1233.30	-0.64	0.525
migration background	unmatched	-1.120	-0.779	-11.10		-2.92	0.004
	matched	-1.120	-1.057	-2.10	81.50	-0.39	0.697
age	unmatched	19.835	19.911	-3.30		-0.89	0.375
	matched	19.835	19.915	-3.50	-5.80	-0.66	0.511
age (square term)	unmatched	399.260	400.780	-1.60		-0.43	0.670
	matched	399.260	402.610	-3.50	-120.10	-0.64	0.519
relationship status (reference: neither married nor in a relationship)							
not specified	unmatched	0.006	0.002	6.90		2.11	0.035
	matched	0.006	0.004	3.90	42.90	0.71	0.479
married	unmatched	0.023	0.014	6.00		1.64	0.101
	matched	0.023	0.028	-4.20	30.80	-0.72	0.474
in a relationship	unmatched	0.310	0.294	3.50		0.88	0.378
	matched	0.310	0.313	-0.70	80.40	-0.13	0.893
living arrangements							
with biological/adoptive father	unmatched	0.606	0.643	-7.60		-1.94	0.053
	matched	0.606	0.616	-2.10	72.90	-0.41	0.682
with biological/adoptive mother	unmatched	0.719	0.769	-11.50		-2.98	0.003
	matched	0.719	0.733	-3.20	72.70	-0.62	0.538
with stepmother/father's partner	unmatched	0.010	0.008	1.60		0.42	0.671
	matched	0.010	0.011	-0.70	60.00	-0.12	0.902
with stepfather/mother's partner	unmatched	0.040	0.030	5.30		1.39	0.165
	matched	0.040	0.028	6.80	-29.00	1.38	0.166
with sister, brother	unmatched	0.469	0.482	-2.60		-0.65	0.517
	matched	0.469	0.491	-4.40	-70.70	-0.88	0.381
with other relatives	unmatched	0.058	0.044	6.10		1.61	0.107
	matched	0.058	0.043	6.80	-11.60	1.38	0.169
with spouse	unmatched	0.100	0.070	10.90		2.90	0.004
	matched	0.100	0.101	-0.40	95.90	-0.08	0.934
with own child/children	unmatched	0.036	0.020	9.60		2.66	0.008
	matched	0.036	0.036	0.40	96.10	0.07	0.946
with other children	unmatched	0.001	0.001	0.90		0.25	0.803
	matched	0.001	0.002	-1.90	-100.00	-0.32	0.752
in a shared apartment	unmatched	0.011	0.018	-5.70		-1.36	0.175
	matched	0.011	0.009	1.60	72.70	0.37	0.711
by oneself	unmatched	0.094	0.083	4.00		1.02	0.307
	matched	0.094	0.081	4.40	-11.10	0.88	0.377
other	unmatched	0.009	0.009	0.00		0.00	1.000
	matched	0.009	0.010	-1.30	0.00	-0.26	0.795
not specified	unmatched	0.004	0.003	1.60		0.43	0.665
	matched	0.004	0.003	1.10	33.30	0.21	0.831

variable	group	mean		% bias	% red. bias	t-test	
		treated	control			t	p > t
Household in the need of benefit (reference: yes)							
not specified	unmatched	0.014	0.010	3.50		0.92	0.358
	matched	0.014	0.021	-6.90	-100.00	-1.14	0.253
no	unmatched	0.178	0.151	7.10		1.83	0.068
	matched	0.178	0.183	-1.50	78.60	-0.29	0.770
disability (reference: yes)							
not specified	unmatched	0.006	0.003	4.00		1.13	0.260
	matched	0.006	0.007	-0.90	77.80	-0.15	0.877
not disabled	unmatched	0.013	0.031	-12.70		-2.87	0.004
	matched	0.013	0.010	1.70	86.40	0.47	0.636
commitment in clubs (reference: yes)							
not specified	unmatched	0.001	0.002	-1.60		-0.38	0.705
	matched	0.001	0.001	0.00	100.00	0.00	1.000
no	unmatched	0.329	0.333	-0.80		-0.20	0.840
	matched	0.329	0.323	1.20	-50.00	0.24	0.810
equipment at home							
more than 100 books or the like	unmatched	0.423	0.428	-1.20		-0.30	0.761
	matched	0.423	0.420	0.50	57.90	0.10	0.919
own bedroom	unmatched	0.824	0.813	2.90		0.73	0.464
	matched	0.824	0.825	-0.30	88.90	-0.07	0.948
a computer	unmatched	0.739	0.758	-4.50		-1.16	0.247
	matched	0.739	0.764	-5.90	-30.20	-1.19	0.236
a car	unmatched	0.749	0.738	2.40		0.61	0.540
	matched	0.749	0.750	-0.30	88.20	-0.06	0.954
a own yard	unmatched	0.601	0.580	4.30		1.09	0.275
	matched	0.601	0.594	1.50	64.70	0.31	0.760
none of this	unmatched	0.009	0.011	-2.20		-0.54	0.587
	matched	0.009	0.010	-1.30	42.90	-0.26	0.795
not specified	unmatched	0.015	0.014	0.80		0.20	0.841
	matched	0.015	0.017	-1.60	-100.00	-0.30	0.765
parents' participation at school (reference: yes)							
not specified	unmatched	0.011	0.012	-0.60		-0.15	0.883
	matched	0.011	0.008	3.50	-500.00	0.78	0.437
no	unmatched	0.841	0.887	-13.20		-3.50	0.000
	matched	0.841	0.861	-5.70	57.20	-1.09	0.277
type of secondary education level (reference: intermediate secondary degree)							
not specified	unmatched	0.006	0.001	8.90		3.01	0.003
	matched	0.006	0.002	7.30	17.60	1.38	0.169
special school	unmatched	0.005	0.013	-8.80		-1.98	0.048
	matched	0.005	0.004	0.70	92.60	0.18	0.855
lower secondary degree (9th grade). school leaving certificate	unmatched	0.309	0.185	28.90		7.72	0.000
	matched	0.309	0.313	-0.90	97.00	-0.16	0.871
lower secondary degree. 10th grade	unmatched	0.230	0.174	13.90		3.63	0.000
	matched	0.230	0.243	-3.30	76.40	-0.62	0.537
higher secondary degree	unmatched	0.069	0.203	-39.80		-8.98	0.000
	matched	0.069	0.076	-2.20	94.40	-0.58	0.563
other	unmatched	0.003	0.001	2.90		0.82	0.414
	matched	0.003	0.005	-5.80	-100.00	-0.82	0.414
degree not officially recognized in Germany	unmatched	0.010	0.012	-2.10		-0.51	0.608
	matched	0.010	0.009	1.20	42.90	0.26	0.795

variable	group	mean			% red. bias	t-test	
		treated	control	%bias		t	p > t
grade in German in last school report (reference: satisfactory)							
not specified	unmatched	0.040	0.026	7.70		2.07	0.038
	matched	0.040	0.037	1.70	77.30	0.32	0.745
outstanding	unmatched	0.016	0.023	-4.50		-1.10	0.273
	matched	0.016	0.014	1.40	70.00	0.31	0.760
good	unmatched	0.218	0.233	-3.60		-0.90	0.367
	matched	0.218	0.193	5.80	-62.50	1.21	0.228
adequate	unmatched	0.216	0.183	8.20		2.12	0.034
	matched	0.216	0.223	-1.60	81.00	-0.30	0.763
poor	unmatched	0.026	0.024	1.60		0.41	0.681
	matched	0.026	0.022	2.80	-75.00	0.57	0.568
fail	unmatched	0.004	0.001	5.80		1.84	0.066
	matched	0.004	0.009	-10.30	-77.80	-1.27	0.205
grade in Maths in last school report (reference: satisfactory)							
not specified	unmatched	0.034	0.025	5.20		1.37	0.170
	matched	0.034	0.033	0.40	92.90	0.07	0.945
outstanding	unmatched	0.048	0.042	2.60		0.66	0.509
	matched	0.048	0.048	-0.30	88.20	-0.06	0.953
good	unmatched	0.254	0.241	3.00		0.76	0.450
	matched	0.254	0.263	-2.20	26.80	-0.43	0.669
adequate	unmatched	0.249	0.228	4.80		1.24	0.217
	matched	0.249	0.252	-0.70	84.80	-0.14	0.885
poor	unmatched	0.068	0.054	5.80		1.51	0.132
	matched	0.068	0.061	2.60	54.50	0.51	0.611
fail	unmatched	0.004	0.003	0.50		0.13	0.894
	matched	0.004	0.004	-1.00	-100.00	-0.20	0.844
attended kindergarten	unmatched	0.924	0.926	-0.90		-0.24	0.809
	matched	0.924	0.929	-1.90	-100.00	-0.38	0.702
time between school leaving and begin of apprenticeship							
not specified	unmatched	0.093	0.079	4.90		1.27	0.204
	matched	0.093	0.079	4.90	0.00	0.98	0.326
up to 24 months	unmatched	0.290	0.341	-11.00		-2.74	0.006
	matched	0.290	0.273	3.60	66.90	0.75	0.453
25 to 36 months	unmatched	0.210	0.215	-1.10		-0.29	0.772
	matched	0.210	0.203	1.70	-46.70	0.34	0.734
37 to 48 months	unmatched	0.100	0.115	-4.90		-1.23	0.220
	matched	0.100	0.096	1.40	71.40	0.29	0.769
49 to 60 months	unmatched	0.061	0.056	2.30		0.58	0.562
	matched	0.061	0.063	-0.80	64.70	-0.16	0.877
61 to 72 months	unmatched	0.045	0.028	8.80		2.39	0.017
	matched	0.045	0.049	-2.30	73.60	-0.41	0.680
73 to 84 months	unmatched	0.030	0.023	4.30		1.12	0.261
	matched	0.030	0.038	-4.70	-9.10	-0.83	0.406
85 to 96 months	unmatched	0.030	0.016	9.60		2.70	0.007
	matched	0.030	0.031	-0.40	95.70	-0.07	0.942
more than 96 months	unmatched	0.035	0.016	12.10		3.47	0.001
	matched	0.035	0.049	-9.10	24.60	-1.43	0.153

variable	group	mean		% red.		t-test	
		treated	control	%bias	bias	t	p > t
commute to apprenticing firm							
not specified	unmatched	0.003	0.002	2.10		0.57	0.571
	matched	0.003	0.002	1.40	33.30	0.27	0.789
up to 30 minutes	unmatched	0.341	0.349	-1.60		-0.40	0.690
	matched	0.341	0.368	-5.70	-258.30	-1.12	0.262
31 to 45 minutes	unmatched	0.086	0.128	-13.50		-3.24	0.001
	matched	0.086	0.083	1.20	91.00	0.27	0.787
46 to 60 minutes	unmatched	0.070	0.098	-10.10		-2.46	0.014
	matched	0.070	0.057	4.70	53.30	1.08	0.282
61 to 90 minutes	unmatched	0.024	0.038	-8.00		-1.90	0.058
	matched	0.024	0.024	-0.40	95.50	-0.08	0.935
more than 90 minutes	unmatched	0.005	0.013	-8.30		-1.87	0.061
	matched	0.005	0.007	-2.00	76.00	-0.49	0.626
occupation between leaving school and begin of apprenticeship							
basic vocational year (BGJ)	unmatched	0.211	0.129	22.10		5.95	0.000
	matched	0.211	0.223	-3.00	86.40	-0.55	0.585
pre-vocational treatments	unmatched	0.249	0.302	-12.00		-2.98	0.003
	matched	0.249	0.278	-6.40	46.20	-1.31	0.192
job application training	unmatched	0.331	0.294	8.10		2.07	0.039
	matched	0.331	0.324	1.50	81.70	0.29	0.770
occupational orientation course	unmatched	0.106	0.120	-4.20		-1.06	0.290
	matched	0.106	0.089	5.30	-25.60	1.14	0.256
short internship (several days)	unmatched	0.391	0.342	10.30		2.63	0.008
	matched	0.391	0.411	-4.00	61.00	-0.79	0.429
language course	unmatched	0.016	0.034	-11.40		-2.62	0.009
	matched	0.016	0.016	0.40	96.50	0.10	0.921
jobbing	unmatched	0.481	0.443	7.60		1.94	0.053
	matched	0.481	0.492	-2.10	72.10	-0.42	0.671
BNW	unmatched	0.013	0.003	10.70		3.37	0.001
	matched	0.013	0.021	-9.20	13.30	-1.27	0.203
Internationaler Bund (ib)	unmatched	0.006	0.002	7.50		2.38	0.018
	matched	0.006	0.006	0.00	100.00	0.00	1.000
CJD	unmatched	0.009	0.001	11.30		3.96	0.000
	matched	0.009	0.005	5.40	52.00	0.91	0.364
educational centre	unmatched	0.005	0.001	7.50		2.46	0.014
	matched	0.005	0.000	9.20	-23.10	2.00	0.045
qualification. further training	unmatched	0.003	0.005	-3.70		-0.85	0.395
	matched	0.003	0.003	0.00	100.00	0.00	1.000
college	unmatched	0.005	0.024	-16.20		-3.46	0.001
	matched	0.005	0.005	0.00	100.00	0.00	1.000
sport	unmatched	0.001	0.001	0.90		0.25	0.803
	matched	0.001	0.000	3.80	-300.00	1.00	0.317
treatment in general. not remembering name	unmatched	0.001	0.003	-3.50		-0.79	0.429
	matched	0.001	0.001	0.00	100.00	0.00	1.000
driver's license							
driver's license for car	unmatched	0.430	0.486	-11.20		-2.82	0.005
	matched	0.430	0.433	-0.60	94.40	-0.13	0.900
driver's license for motorcycle. moped	unmatched	0.158	0.157	0.10		0.02	0.983
	matched	0.158	0.176	-5.00	-5700.00	-0.97	0.331
no	unmatched	0.510	0.468	8.40		2.14	0.033
	matched	0.510	0.498	2.40	71.90	0.47	0.635
side job	unmatched	0.068	0.068	-0.10		-0.03	0.975
	matched	0.068	0.074	-2.50	-1900.00	-0.49	0.626

variable	group	mean		%bias	% red.	t-test	
		treated	control			t	p > t
reasons for termination of the apprentice (reference: self-determined)							
not specified	unmatched	0.814	0.811	0.70		0.18	0.856
	matched	0.814	0.819	-1.40	-100.00	-0.29	0.771
terminated by firm	unmatched	0.043	0.063	-9.40		-2.24	0.025
	matched	0.043	0.043	0.00	100.00	0.00	1.000
shutdown of the establishment	unmatched	0.020	0.011	7.60		2.14	0.033
	matched	0.020	0.018	1.50	80.00	0.27	0.784
consensual	unmatched	0.031	0.027	2.40		0.62	0.533
	matched	0.031	0.028	1.90	23.10	0.37	0.713
apprenticeship successfully finished	unmatched	0.003	0.002	1.30		0.35	0.723
	matched	0.003	0.004	-4.00	-200.00	-0.64	0.522
number of written applications							
not specified	unmatched	0.085	0.065	7.60		2.00	0.046
	matched	0.085	0.071	5.50	28.10	1.07	0.283
up to 20	unmatched	0.179	0.175	0.90		0.23	0.819
	matched	0.179	0.163	4.10	-354.50	0.83	0.407
21 to 40	unmatched	0.175	0.183	-2.20		-0.55	0.580
	matched	0.175	0.203	-7.30	-233.30	-1.44	0.151
41 to 60	unmatched	0.116	0.127	-3.30		-0.84	0.403
	matched	0.116	0.114	0.60	82.90	0.12	0.907
61 to 100	unmatched	0.080	0.088	-3.00		-0.76	0.448
	matched	0.080	0.080	0.00	100.00	0.00	1.000
101 to 200	unmatched	0.049	0.046	1.20		0.30	0.765
	matched	0.049	0.049	-0.30	75.00	-0.06	0.954
more than 200	unmatched	0.013	0.022	-7.40		-1.74	0.082
	matched	0.013	0.018	-4.30	41.90	-0.92	0.360