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Gudrun Schönfeld | Felix Wenzelmann | Harald Pfeifer | Paula Risius | Caroline Wehner

Training in Germany – an investment to counter the skilled worker shortage

Results of the 2017/18 BIBB Cost-Benefit Survey

A shortage of skilled workers has been placing a strain on broad sections of the economy for a number of years (cf. e. g. DIHK 2020, ZEIT ONLINE 2019). One way in which firms can cover their needs for skilled workers is to offer apprenticeship training. However, there are a number of questions to ask first: Which costs and benefits are associated with apprenticeship training? Is it worthwhile financially for firms to provide apprenticeship training themselves, or does accessing skilled workers from the labour market offer a less costly means of meeting skills requirements? Information relating to firms' costs and benefits of apprenticeship training and of the recruiting of skilled workers are crucial in terms of answering these questions.

Introduction

The two major ways in which firms can cover their requirements for skilled workers are to provide apprenticeship training themselves and to recruit via the external labour market. The costs of each of these respective routes for the acquisition of trained workers play a major role in the firms' decisions. Current data is needed in order to investigate how firms react to the skilled worker shortage in many regions and economic sectors. To this end, the Federal Institute for Vocational Education and Training (BIBB) conducted a representative survey on apprenticeship training and on the recruitment of skilled workers for the training year 2017/18. The survey covered 3,049 firms providing apprenticeship training and 996 firms not offering training.

Federal Institute for Vocational Education and Training

The main results to emerge from the 2017/18 BIBB Cost-Benefit Survey (2017/18 BIBB-CBS) are set out below. This is the only survey in Germany to collect extensive data on these topics. Training costs and returns on training are presented for the number of apprentices as a whole, for western and eastern Germany, by firm size categories, by occupational groups, by training sectors, and by years of training. The development of training costs over the past ten years is then portrayed. Data from the BIBB Cost-Benefit Surveys of 2007 (cf. Schönfeld et al. 2010) and 2012/13 (cf. Schönfeld et al. 2016) is used for this purpose. Consideration is accorded to two aspects of the longer-term benefit of training-costs for the recruitment of skilled workers and the retention strategy firms after the graduation of their apprentices. Combined with evaluations of the medium-term retention at the firm, the latter aspect in particular supplies important information as to whether firms are placing greater reliance on their own training given the current strain in terms of the skilled worker situation. We end by collating the core results and drawing our conclusions.

Methodological explanations for the 2017/18 Survey

The 2017/18 BIBB Cost-Benefit Survey was conducted by the *infas Institut für angewandte Sozialforschung* GmbH from September 2018 to July 2019. The sample used was taken from the Federal Employment Agency (BA) firm database, which includes all firms with at least one employee subject to mandatory social insurance contributions. Infas carried out computer-assisted interviews at 3,049 firms providing training and at 996 firms not offering training. The interview partners in each case were the members of staff responsible for training or human resources management. In the case of smaller firms, these persons were frequently the firm owners. The average duration of interviews at firms providing training was 83 minutes as opposed to 49 minutes at firms not offering training.

Questions relating to the costs and benefits of firm-based training or to the costs of recruitment of skilled workers were in each case posed for a certain occupation in the dual system, in which training takes place in accordance with the regulations set out in the Vocational Training Act (BBiG) or the Crafts and Trades Regulation Code (HwO). If a firm provided training in more than one occupation, the occupation covered in the interview was randomly selected from up to six of the most prevalent occupations. The probability that each occupation would be chosen was equal. In the case of firms not offering training, the questions related to the training occupation of the skilled worker last recruited.

Iteratively determined, sample-neutral weighting was used to calculate representative results for Germany. Costs and returns of training were weighted on the basis of the apprentices. Each apprentice at a firm (up to a maximum of ten apprentices per firm and year of training) received a weighting in line with the marginal distribution of apprentices by year of training, firm size category and training sector. A total of 10,858 apprentices from the 3,049 firms providing training were included in the calculations. The results presented state the average gross costs, returns and net costs per apprentice that arose at one firm during the 2017/18 training year.

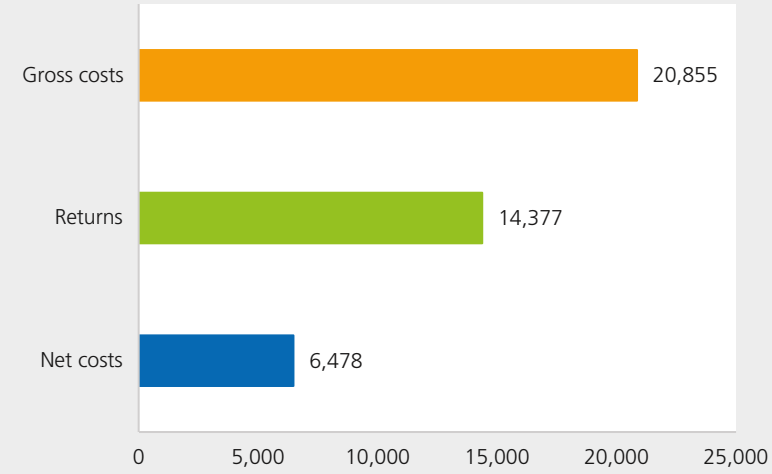
Firm data was used for the evaluations relating to the recruitment of skilled workers and to behaviour exhibited by firms in terms of employing apprentices permanently upon completion of training and for the multivariate regressions. Weightings for the firm dataset were also determined iteratively via marginal distributions of firm size category, region, economic sector, and training activity.

Around two thirds of gross costs are covered by returns

The average gross costs per apprentice in the 2017/18 training year were €20,855. The productive output of an apprentice generated average returns of €14,377 for the firms. Subtracting the returns from the gross costs therefore indicates net costs of €6,478 per apprentice and year (cf. Figure 1). This means that 69 per cent of gross costs were covered by returns. Although this value has scarcely changed compared to the 2012/13 training year (70%), it represents a drop of seven percentage points from the year 2007.

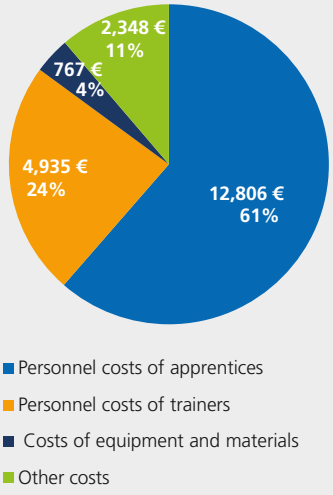
The calculation of these costs takes place using a further development of a model used by the Expert Commission on Costs and Financing of Vocational Education and Training (1974). Gross costs and returns comprise various cost values, which are initially collected separately in the survey and then collated in the cost model (for more detailed information on the methodology of the costs and returns calculation cf. Schönfeld et al. 2016, pp. 19–25). Gross costs encompass all material and personnel costs incurred by a firm for apprenticeship training. They are cumulated into four main cost blocks (cf. Figure 2). In the 2017/18 training year, the **personnel costs of apprentices** made up the largest proportion of gross costs by accounting for 61 per cent or €12,806 of the total. This figure includes the gross training allowances paid to apprentices and social benefits provided on a statutory or voluntary basis or in accordance with a collective wage agreement.

Figure 1: Gross costs, returns and net costs per apprentice in the 2017/18 training year (in €)



n = 10,858
Source: BIBB-CBS 2017/18

Figure 2: Distribution of gross costs per apprentice in the 2017/18 training year by types of cost (in % and €)



n = 10,858
Source: BIBB-CBS 2017/18

The average firm expenditure on the personnel **costs of trainers** was €4,935. This represented approximately one quarter of overall gross costs. Gross wages and further personnel costs are also taken into account in the case of trainers. These costs are included for all persons involved in the training, although only to the extent of the time they spend on delivering training services. A distinction is drawn between full-time, part-time and external trainers. The core task of full-time trainers is to provide training. Time spent by full-time trainers on generating products or services, which the firm is able to utilise, was not taken into consideration when determining the volume of hours included in the cost calculation. Part-time trainers only perform training activities intermittently alongside their actual tasks at the firm. With regard to the calculation of training costs, delivering training is only deemed to be relevant if this reduces the productivity of these actual tasks. In the case of training times of part-time trainers, any decrease in productivity during these periods was thus also recorded.[1] In respect of external trainers, costs of fees, travel and overnight accommodation were included.

Costs of equipment and materials comprised a proportion of four per cent or €767 and therefore constituted only a small part of the gross costs. These were composed of acquisition costs for the tools and equipment used by apprentices, costs of training workshops or in-firm teaching, and costs of consumables required for practice purposes.

In the 2017/18 training year, **other costs** amounted to €2,348 (11%) per apprentice. Some of the items included in this category are chamber fees, costs of teaching and learning materials, costs of external courses and costs of administration including the costs for the recruitment of the apprentices.

▸ Simple and skilled tasks each produce half of the returns

One of the particular characteristics of dual training is a close interconnection between learning and work. Even while still training, apprentices are involved in the work carried out at the firm and contribute towards ongoing production and delivery of services during this period. Productive output may be generated at the workplace and in the training workshop.[2] In 2017/18, about one in ten firms received grants for at least some of its apprentices from Federal Government or federal state funding programmes, from the European Social Fund (ESF), from the Federal Employment Agency or from professional or

1 This means, for example, that one hour is included in the cost calculation if the volume of training hours is ten and the decrease in productivity is ten per cent.

2 A training workshop is defined in the survey as a dedicated institution located within the company which is used for training purposes. The training workshop is separated from normal workplaces in both spatial and organisational terms. It provides a venue where apprentices are able to learn independently from the production process. The term does not refer to inter-company vocational training centres or to workshops at vocational schools. By this definition, four per cent of companies providing training had a training workshop in place. Just under a fifth of apprentices were instructed in a training workshop.

sector associations. These grants were counted as returns.

Returns produced in the workplace are calculated on the basis of the equivalence principle. This means that returns correspond to the costs which the firm would have incurred if the tasks performed by apprentices had been carried out by regular employees. A differentiation is made between simple tasks, which are normally executed by semi-skilled or unskilled workers, and skilled tasks usually completed by qualified staff. Both sorts of activity are evaluated in line with the wage costs of the relevant group of employees. In the case of skilled tasks, account is also taken of the degree of performance which apprentices achieve compared to an average qualified worker at the firm. The survey enquires about this for each year of training. If the degree of performance is 50 per cent, for example, then only 30 minutes of the hourly wage cost of a skilled worker will be included in the calculation of the returns. In the 2017/18 training year, 48 per cent of returns shown in Figure 1 were created via simple tasks. The equivalent value in this case was €6,852 per apprentice and year. The proportion of returns generated by skilled tasks was slightly higher (50 per cent, €7,207).

The times during which apprentices undertake productive activities in the training workshop is also evaluated on the basis of skilled worker wages whilst according consideration to degree of performance. This created an average equivalent value of €118 per apprentice and year (1% of returns). Grants from various funding programmes were €199 per apprentice on average and thus constituted only a small proportion of the total returns of €14,377 (1%).

▶ Training at large firms and in the public sector is associated with high levels of investment

The values previously presented are average figures per apprentice and year of training. Nevertheless, all values exhibit a high level of variance between firms. This can be explained in some cases by regional, occupational or firm factors. In order to illustrate the differences, gross costs, returns and net costs will be depicted below in accordance with various firm characteristics (region, firm size, training sector and firms with and without a training workshop).[3]

Figure 3 provides an initial overview of the distribution of net costs per apprentice across all firms in the 2017/18 training year. It illustrates the large spread of training costs, reaching from net returns (= negative net costs) of over €25,000 to net costs (i.e. gross costs outweigh returns) of more than €50,000. Values for some individual firms are even higher. Returns exceed gross costs — i.e. net returns are generated — for about 28 per cent of apprentices. Net costs of €20,000 or more were incurred in the case of around eleven per cent of apprentices.

Table 1 depicts gross costs, returns and net costs in accordance with various characteristics of the firm and of the training occupation. These characteristics have already proven to be important explanatory variables in previous cost-benefit surveys.

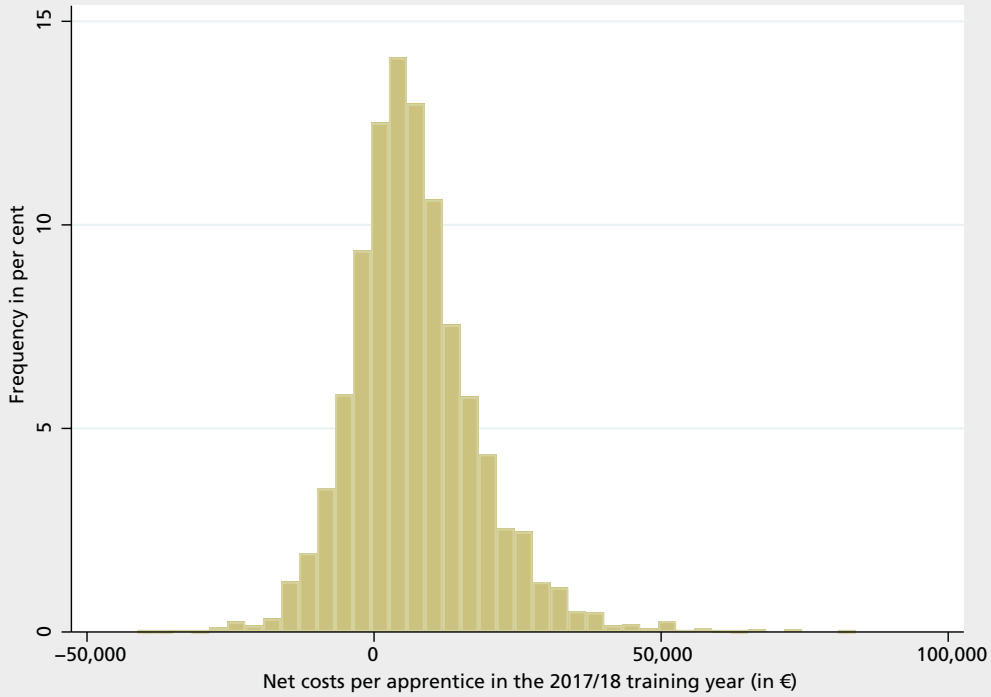
Average net costs in eastern Germany (including Berlin) were €900 lower than in western Germany. Even 30 years after the fall of the Berlin Wall, wages and training allowances in the east remain below those in the west (cf. Schönfeld/Wenzelmann 2020), which is a significant reason for the differences between the two regions, because they are reflected in all types of costs and returns which are determined by personnel costs. Gross costs in the east were around 16 per cent lower than in the west. Returns were approximately 17 per cent lower.

Clear differences were revealed between the various firm size categories. Gross costs of €24,817 were incurred at large firms with 500 employees or more, the highest figure by some distance. This category of firm also generated the lowest returns. Large firms thus had net costs of €11,629, well above the levels recorded for the other firm size categories. In the 2017/18 training year, apprentices at large firms were clearly less likely to be productively deployed than their counterparts at smaller firms. This is also connected with the circumstance whereby many large firms conduct parts of their training in a training workshop. Firms with between ten and 49 employees recorded the lowest gross and net costs. Net costs at the smallest category of firms with between one and nine employees were €6,168. This is higher than the figure for the next two firm size categories, in particular because returns were comparatively low at €13,256, an amount only slightly higher than that reported for large firms.

Gross costs in excess of €20,000 were recorded in both the public sector (€25,045) and in trade and industry (€22,217). The lowest gross costs were measured in the craft trade sector (€17,992). With regard to returns, only small differences were shown between the training areas of trade and indus-

3 A conscious decision has been made at this point not to consider training costs for individual training occupations. These will be presented in later publications and are also available in tabular form at https://www.bibb.de/de/11060.php.

Figure 3: Distribution of net costs per apprentice in the 2017/18 training year (in €)



Explanation: The columns reflect the percentage proportion of apprentices with the respective net costs (horizontal axis).
n = 10,858
Source: BIBB-CBS 2017/18

try, the liberal professions and agriculture (around €15,000 in each case). A slightly lower figure of €14,175 was recorded for the public sector. Returns in the craft trade sector were significantly lower at €12,414. One of the reasons for this is that apprentices are less likely to be assigned skilled tasks than in the other training areas. As far as net costs for 2017/18 were concerned, the same pattern as for the gross costs was shown in that the public sector (€10,870) and trade and industry (€7,039) were clearly ahead of the other training areas. The lowest net costs (€3,898) were recorded by firms in the agricultural sector.

If we draw a distinction between commercial occupations, industrial occupations and STEM occupations,[4] only relatively small differences are revealed in terms of gross costs between commercial and STEM occupations. In industrial occupations, they were around €2,200 lower. The returns in the commercial occupations were clearly higher than in the two other occupations. Especially for STEM occupations, a significantly lower figure of €12,169 was recorded. This occupational group accordingly exhibited clearly higher net costs of €9,167, whereas the corresponding figure for commercial occupations was €5,051 and for industrial occupations €4,384. More than two thirds of apprentices in STEM occupations were completing a training programme of three and a half years' duration. The following section will look at the particular characteristics in these occupations and at the consequences for gross costs, returns and net costs.

Training in a training workshop is usually associated with high costs. This is due firstly to the direct costs involved in maintaining workshops of this kind (e.g. rent or machines) and secondly to the greater costs of training staff. Spending periods of learning in training workshops also means that apprentices have less opportunity to be productive and thus generate fewer returns. For this reason, net costs at firms with a

4 In 2018, STEM occupations replaced technical occupations in BIBB's analysis of developments in occupational structures. Division of STEM occupations takes place in line with a delineation made by the Federal Employment Agency on the basis of the five-digit codes contained in the 2010 Classification of Occupations. According to this definition, STEM occupations encompass all tasks "which can only be exercised by those with a high proportion of knowledge and skills from the fields of mathematics, information technology, the natural sciences and/or engineering. The construction and maintenance of technical plants and equipment are deemed to be part of the STEM occupations if these form the core component of a task, but not the mere operation of machines" (Kroll 2019, pp. 131 ff.). As far as the dual training occupations are concerned, delineations between technology and STEM occupations largely correlate. For information on the division of STEM occupations, cf. Kroll/Uhly 2018.

Table 1: Gross costs, returns and net costs per apprentice in the 2017/18 training year by various characteristics (in €)

Characteristics	Gross costs	Returns	Net costs	n
Total	20,855 (8,800)	14,377 (7,518)	6,478 (11,452)	10,858
Region				
Western Germany	21,313 (8,955)	14,712 (7,653)	6,601 (11,796)	9,513
Eastern Germany	17,974 (7,115)	12,271 (6,203)	5,703 (8,960)	1,345
Firm size category				
1 to 9 employees	19,425 (8,881)	13,256 (6,376)	6,168 (10,693)	961
10 to 49 employees	18,937 (7,367)	14,563 (7,539)	4,374 (10,247)	2,705
50 to 499 employees	20,834 (8,124)	15,331 (7,444)	5,503 (10,860)	4,225
500 employees or more	24,817 (10,438)	13,188 (8,214)	11,629 (13,185)	2,967
Training sector[1]				
Trade and industry	22,217 (9,217)	15,178 (8,038)	7,039 (12,580)	6,555
Craft trades	17,992 (7,909)	12,414 (6,465)	5,578 (9,572)	2,230
Agriculture	18,854 (5,153)	14,956 (4,933)	3,898 (5,613)	211
Liberal professions	19,815 (7,186)	15,115 (6,422)	4,700 (9,940)	688
Public sector	25,045 (6,958)	14,175 (7,346)	10,870 (9,565)	1,139
Occupational group				
Commercial occupations	21,230 (7,484)	16,179 (7,006)	5,051 (10,133)	5,547
Industrial occupations	19,047 (7,816)	14,664 (6,575)	4,384 (9,841)	2,246
STEM occupations	21,336 (10,404)	12,169 (7,944)	9,167 (13,014)	3,065
Training Workshop				
No training workshop	20,078 (8,335)	15,127 (7,310)	4,951 (10,529)	8,938
Training workshop	24,363 (9,924)	10,991 (7,514)	13,372 (12,839)	1,920

Explanation: Weighted average value in the first row, standard deviation in brackets in second row.
[1] Results for the training area of housekeeping are not shown due to the low sample size.
Source: BIBB-CBS 2017/18

training workshop were almost €8,500 higher than at firms without such a facility. The difference was almost equally caused by higher gross costs and lower returns.

The large standard deviations (cf. Table 1, stated in brackets in each case) indicate that not all differences in costs and returns can be explained by the characteristics presented. Firms are not heterogeneous, even within a group of characteristics, and parameters such as training allowances, wages and training organisation sometimes differ significantly between firms, which are otherwise very similar.

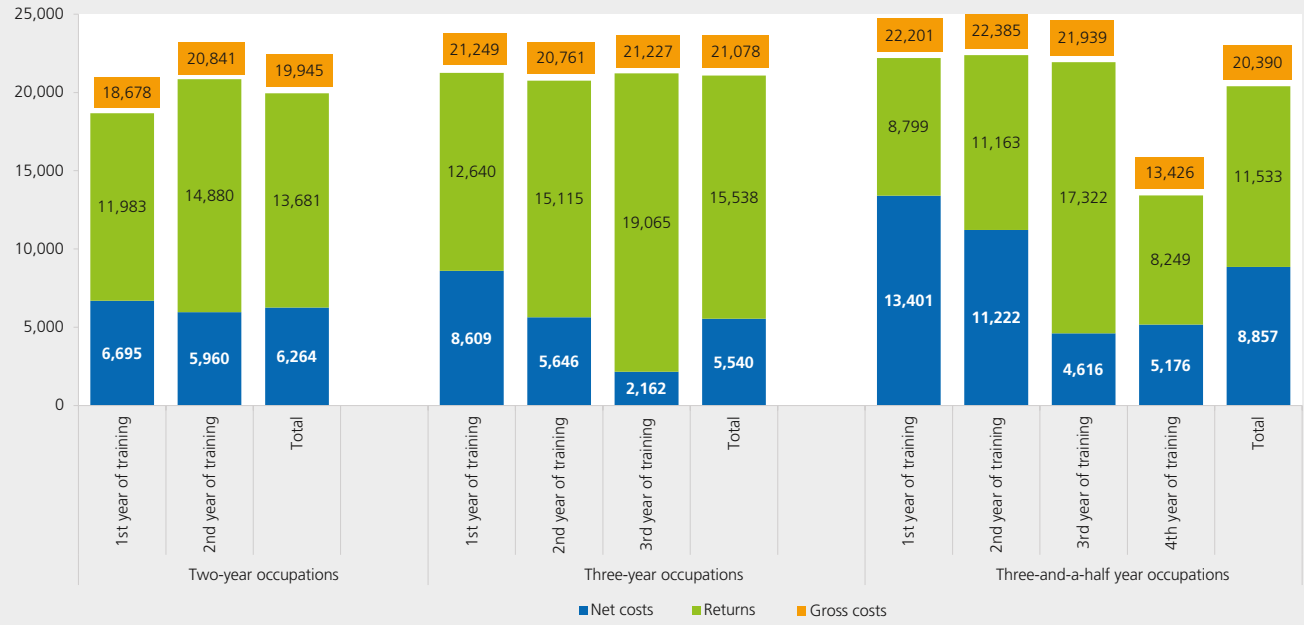
Slight differences in gross costs by years of training, but strong increase in returns

The amount of costs and returns changes over the course of training. The pivotal factors in this regard are the increase in training allowances, which is statutorily stipulated, a rise in productivity and the organisation of training (e.g. a reduction in periods purely devoted to learning). Duration of training in the various occupations is two, three or three and a half years. Length of training is prescribed in the training regulations and is contingent on the period of time deemed necessary in order to practise professional skills and ultimately to achieve firm mastery of these in the respective occupation within the scope of the work process.[5] Figure 4 looks at average values by duration of training whilst also differentiating for individual years of training.

In the case of the two-year occupations, returns rose somewhat more sharply than gross costs from the first to the second year of training. This led to a decrease of €735 in net costs. In overall average terms across all years of training, net costs in two-year occupations were higher than those in three-year occupations but significantly lower than in three-and-a-half year occupations. In the three-year occupations, gross costs were relatively closely bunched in all three years of training and only differed by around €500. There was an increase in returns, which rose somewhat more between the second and third year than

5 Training can be shortened for higher ability apprentices or for apprentices with prior learning. This may be agreed at the time when the contract is concluded or during the course of training as long as the objective of training is achieved in the curtailed time (cf. in this regard the recommendations issued by the Board of the Federal Institute for Vocational Education and Training 2008). The duration of training stipulated per occupation in the respective training regulations forms the basis of assumption for the cost calculations each time.

Figure 4: Gross costs, returns and net costs per apprentice in the 2017/18 training year by years of training and duration of training (in €)



Please note: The fourth year of training in three-and-a-half-year training occupations only lasts for six months.
Example: Gross costs in the amount of €18,678 per apprentice were produced in the first year of training in two-year occupations, whilst apprentices generated returns of €11,983. Net costs (gross costs – returns) were thus €6,695.
n = 267 (two-year occupations), 8,514 (three-year occupations), 2,077 (three-and-a-half year occupations)
Source: BIBB-CBS 2017/18

between the first and second year. For this reason, net costs reduced considerably from €8,609 in the first year of training to €2,162 on the third year of training.

The three-and-a-half year occupations[6] also revealed only small differences in gross costs per year of training. All values were around €22,000, a higher figure than in occupations with a shorter duration of training. Returns were, by way of contrast, clearly lower. However, these rose in line with years of training in the three-and-a-half year occupations too. Almost all three-and-a-half year occupations are STEM occupations, in which training is particularly cost-intensive. This means that higher costs of equipment and materials are incurred. Training frequently takes place outside the work process, such as in a training workshop. The result of this is that apprentices can only be deployed for productive activities to a relatively small extent.

▸ Only a slight increase in net costs between the 2012/13 and 2017/18 training years

BIBB has conducted a total of six cost-benefit surveys since 1980. This long history makes it possible to observe the development of training costs and of further important key indicators such as the rates of apprentices remaining at a firm following successful completion of training, i.e. the proportion of persons who have passed their training programme and are still employed at the firm providing training after one, three or five years. The following section starts by contrasting the gross costs, returns and net costs from the last three surveys dating from 2007 (cf. Schönfeld et al. 2010) and from the training years 2012/13 (cf. Schönfeld et al. 2016) and 2017/18.[7] A descriptive consideration is provided, and regression analyses are then carried out to control for developments in the structure of the firms providing training in order to show whether changes between the surveys can also be identified independently from changes in the firm structure. Evaluations of human resources acquisition costs for recruitment of a skilled worker are followed by an observation of developments in the rates of apprentices remaining at a firm, in the strategy adopted by firms in respect of employing apprentices

6 Because the fourth year of training lasts for only six months, values cannot be directly compared with those of the other years. Comparability of the total value across all years of training is also restricted compared to training occupations which are of shorter duration.

7 The surveys consist of independent cross-sectional studies. For this reason, no panel analyses can be conducted.

permanently upon completion of training, and in the subjective assessment of availability of skilled workers on the regional labour market. These are crucial parameters for the benefits which firms are able to derive beyond the duration of training. Developments over the course of time may also be viewed as a reaction to the changes on the labour market for skilled workers. These analyses also use the firm datasets from the 2007, 2012/13 and 2017/18 surveys.

Methodological explanations on the comparison of the surveys

The comparative analyses are carried out on the basis of firm data because the following analyses relate to the firm level.[8] With regard to costs and returns, average values are in each case estimated across the entire duration of training including years of training which are vacant. Because of this approach, the average values for the 2017/18 training year presented in Table 2 differ from the values calculated on the basis of the apprentices (cf. Table 1).

The interview approach for enquiring about costs and returns and calculation of the various cost values remained largely unchanged in the 2007, 2012/13 and 2017/18 surveys.[9] The method adopted for the sampling procedure was, however, altered in the 2012/13 survey year. For the 2012/13 and 2017/18 surveys, a random sample was drawn from all firms providing training in a training occupation pursuant to the BBiG or HwO. Because costs and benefits always relate to a certain occupation, information was collected on 211 and 210 occupations respectively.[10] In 2007, on the other hand, only firms offering training in one of the 51 most popular training occupations were included in the sample. For the purpose of the comparison, we assume that these 51 occupations adequately cover the entirety of occupations in 2007 (67% of apprentices underwent training in these occupations). 2,986 firms providing training were surveyed in 2007. The corresponding figures for 2012/13 and 2017/18 were 3,032 and 3,049.

The Consumer Prices Index of the Federal Statistical Office (Federal Statistical Office 2020) was used in order to take account of the general price level of goods and services between 2007 and 2017. Correction factors of 1.14 and 1.05 are produced for the periods from 2007 to 2017 and from 2012 to 2017 respectively. The average values calculated from the 2007 and 2012/13 surveys are multiplied by these figures.

In order to allow better classification of the later results, we begin by taking a brief descriptive glance at changes in the structure of firms providing training and at the general economic conditions and by looking at the research results. Despite an increase in the overall number of firms in Germany, it is revealed that the number of firms providing training fell by about 60,000 in the period from 2007 to 2017. The training quota decreased accordingly from 24.1 per cent in 2007, to 21.3 per cent in 2012 (cf. Hucker 2014) and then to only 19.8 per cent in 2017 (cf. Troltsch 2019). The decline recorded in eastern Germany, where the proportion of firms providing training diminished by five percentage points from 18.8 per cent in 2007 to 13.8 per cent in 2017, was sharper than the dip shown in western Germany (from 25.5% to 21.3%) (cf. BIBB 2019). The drop in the number of firms providing training is driven by the smallest category of firms with fewer than ten employees. In 2007, 56 per cent of firms offering training belonged to this group. By 2017, the figure had slumped to only 45 per cent. This represented a fall of almost a third, although the overall number of firms in the smallest category has remained relatively constant (cf. Troltsch 2019).

Lüthi and Wolter (2020) and Mühlemann, Wolter and Wüest (2009) were able to show for Switzerland that participation in training is also dependent on the performance of the economy. As far as Germany during the period from 2001 to 2007 is concerned, Troltsch und Walden (2007) ascertained that development on the training market was increasingly aligned to the number of "regular" employees and was thus oriented towards the firms' current and future needs for qualified workers and skills. Because of the cross-sectional nature of the study, we are unable to carry out any analyses regarding the influence of economic development on costs and benefits. This should not, however, be completely disregarded when interpreting the results. Measured against an average rise in GDP of 1.2 per cent during the period from 2007 to 2017, above-average growth was recorded for the years 2007 and 2017/18 whilst growth in 2012/13 was below average (Federal Statistical Office 2019).

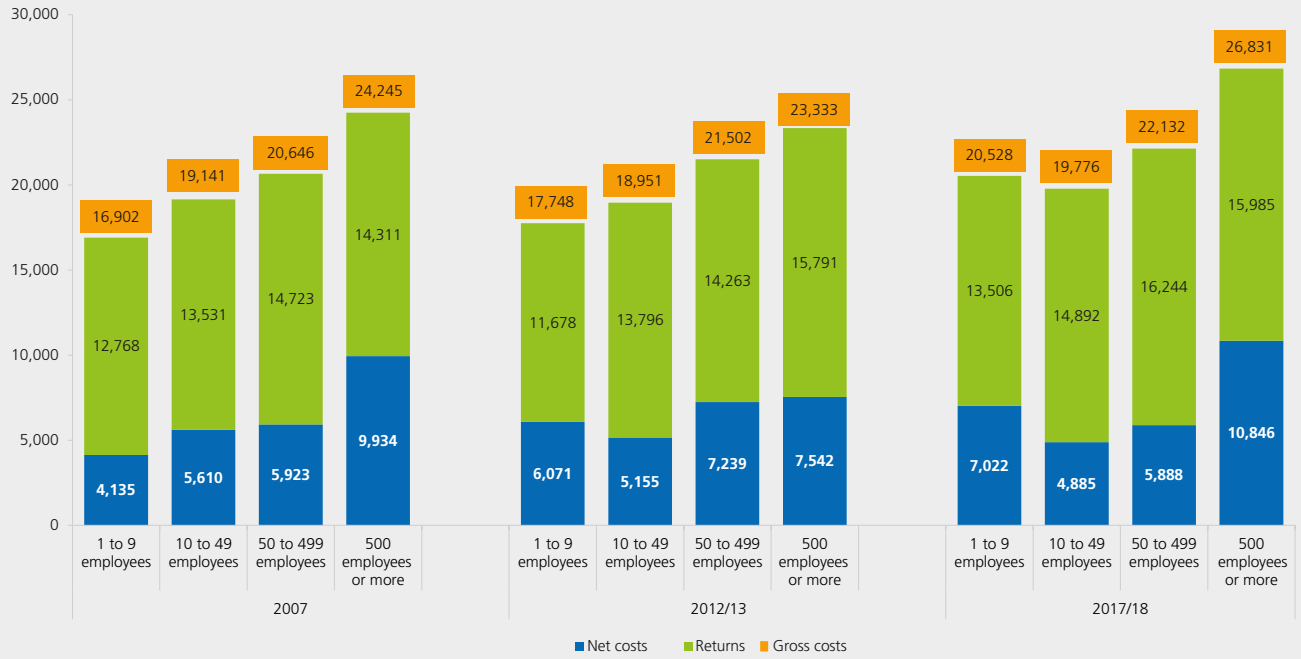
Table 2 presents the results of the descriptive comparison of gross costs, returns and net costs for the three survey years. Both average gross costs and returns saw an increase of approximately the same magnitude between 2012/13 and 2017/18. For this reason,

8 Questions relating to the strategy adopted by companies in respect of employing apprentices permanently upon completion of training or to the skilled worker situation on the regional labour market thus reflect the company perspective rather than relating to apprentices.

9 Minor adjustments in the 2017/18 survey with regard to distribution of training times to the individual years of training exert only a slight influence on the average values calculated. The switch from the calendar year (2007) to the training year (2012/13) also has only a small impact because most questions in all surveys relate to the month of September.

10 Nevertheless, the low sample sizes in the majority of occupations mean that no individual evaluations are possible.

Figure 5: Comparison of the years 2007, 2012/13 and 2017/18 – gross costs, returns and net costs per apprentice by firm size categories (in € at 2017 prices)



n = 2,986 (2007), 3,032 (2012/13), 3,049 (2017/18)
Source: BIBB-CBS 2007, 2012/13 and 2017/18

Table 2: Comparison of the years 2007, 2012/13 and 2017/18 – gross costs, returns and net costs per apprentice (in € at 2017 prices)

Reporting year	Gross costs	Returns	Net costs	n
2007	18,148 (8,419)	13,264 (5,966)	4,883 (9,887)	2,986
2012/13	18,778 (7,872)	12,860 (5,069)	5,919 (9,114)	3,032
2017/18	20,581 (7,843)	14,508 (5,252)	6,072 (9,133)	3,049

Explanation: Weighted average value in the first row, standard deviation in brackets in second row.
Source: BIBB-CBS 2007, 2012/13 and 2017/18

there was only a small rise of €153 in net costs. A large part of the increase in the gross costs and returns can be explained by the fact that the wages of skilled workers involved in training underwent a significant rise in nominal terms since the general price level and rise was higher than between 2007 and 2012/13. Wages or wage costs play an important part in the calculation of both the gross costs and returns. Only a slight rise in gross costs and even a small fall in returns took place from 2007 to 2012/13. Net costs therefore increased more sharply (+ €1,036).[11]

Separation by firm size categories reveals that the rise in net costs between 2012/13 and 2017/18 correlates with changes at the smallest category and at large firms (cf. Figure 5). Firms with fewer than ten employees saw net costs increase by around 16 per cent during this period. In the case of large firms, this figure was even as high as 44 per cent. By way of contrast, a slight reduction occurred in the case of medium-sized firms. Net costs at the smallest category of firms had already risen particularly sharply between 2007 and 2012/13. The cause of this was a slight increase in gross costs accompanied at the same time by a decrease in returns.

Because a representative random sample was drawn in the surveys in each case, the results of the investigations are based on different firms. If the firm structure in Germany alters, this means that the composition of firms in the (weighted) samples may be different. An increase in average costs need not, therefore, necessarily be caused by a

11 Cf. the evaluations by Jansen et al. (2015). One of the reasons for the differences to the results presented there is the 2017/18 reference year. Secondly, Jansen et al. (2015) concentrated on the 51 occupations for which costs had been calculated in 2007.

Table 3: OLS regressions on the influence of the year on gross costs, returns and net costs whilst controlling for other factors (at 2017 prices)

	Gross costs	Returns	Net costs
Year (reference 2007)			
2012/13	147.60 (335.75)	-286.35 (220.13)	433.95 (385.10)
2017/18	2,360.83*** (392.63)	1,070.07*** (239.85)	1,290.77*** (456.93)
Firm size category (reference 1 to 9 employees)			
10 to 49 employees	315.79 (332.15)	1,280.63*** (217.40)	-964.84** (392.63)
50 to 499 employees	1,593.41*** (384.49)	2,343.63*** (255.51)	-750.22* (427.26)
500 employees or more	3,712,55*** (615.56)	3,144.67*** (356,27)	567.88 (700, 85)
Region (reference east Germany	3,488.70*** (463.86)	3,028.59*** (227.82)	460.10 (444.03)
n	9,067	9,067	9,067
Coefficient of determination R^2	0.10	0.13	0.06

Explanation:
Basis: Firm datasets. Robust standard errors in brackets in second row.
Significance levels: *** 1%, ** 5%, * 10%
In the regressions, we additionally control for training sector, for the occupational group (commercial, industrial, technical) and for whether the firm has a training workshop or not.
Source: BIBB-CBS 2007, 2012/13 and 2017/18

rise in costs for the individual firm. Another possible reason is that firms that tend to have lower net costs were less likely to provide training.

In order to consider potential structural changes, we conduct OLS regression analyses[12] using gross costs, returns and net costs as dependent variables to control for different firm compositions in the respective years. We use control variables which have been empirically shown to explain a large proportion of the variance in training costs. These are the training sector, the occupational group (difference between commercial, industrial and technical occupations),[13] the firm size class, the region (western or eastern Germany) and whether the firm has a training workshop or not. Year coefficients stating the year in which the firm was surveyed are the main variable of interest. The reference year is 2007. The respective year coefficient thus represents the average development of costs compared to the year 2007 under the assumption that the influence of the control variables in the surveys has not changed.

Table 3 maps the results of the three regression models. If we control for the variables described, no significant change in gross costs, returns and net costs took place between the 2007 and 2012/13 surveys. As was also the case in the descriptive observation, gross costs and returns were significantly higher in 2017/18 than in 2007. The rise in gross costs is, however, clearly predominant. This means that the coefficient of the net costs is significantly positive. The comparison portrayed here merely aims to provide an initial impression of the development of costs of apprenticeship training. The intention is that the data used should become the object of further and more detailed analyses.

Average recruitment costs make up just under two thirds of the total net training costs

As is shown for the 2017/18 training year (cf. Figure 3), a large proportion of firms make a net investment in training, i.e. gross costs exceed returns. Assuming that firms act in an economically rational way, firms making this investment must expect that training will produce a benefit beyond the work output of apprentices. The training would otherwise not be worth their while. Such a benefit can mainly occur if firms continue to employ apprentices as skilled workers upon completion of training. Firms then no longer need to go to the labour market to recruit skilled workers, who may have to be integrated into the work process via additional continuing training and induction measures. If a firm employs former apprentices, it will save recruitment costs, make itself independent of the labour market and be able to prevent any downtime costs, which may be caused by a staff shortage.

The 2017/18 BIBB-CBS collected recruitment costs of firms in order to obtain information on the extent of such a benefit of training. Costs of the application procedure, of continuing training and of initial productivity differences of new skilled workers are taken into account alongside the expense arising for other staff at the firm in respect of induction of their new colleagues (cf. Table 4 for differentiation of the various types of costs). Calculation of the

12 Ordinary least squares

13 Unlike in the evaluations for the 2017/18 survey (cf. Table 1), the new division into STEM occupations (cf. footnote 4) is not used, because this is not available for the 2007 and 2012/13 surveys. The technical occupations are used instead, but these largely correlate in terms of their delineation (cf. Kroll/Uhly 2019).

Table 4: Recruitment costs for a newly recruited skilled worker by types of cost for western and eastern Germany (in €)

	Total	Western Germany	Eastern Germany
Application procedure, of which:	1,003 (2,080)	1,087 (2,229)	652 (1,216)
Advertising costs	358 (737)	384 (761)	251 (614)
HR costs for the application procedure	396 (642)	414 (674)	320 (479)
Costs of external advisors	249 (1,481)	289 (1,617)	81 (613)
Continuing training during the induction period, of which:	521 (1,691)	554 (1,808)	384 (1,053)
Costs of continuing training	225 (817)	240 (886)	159 (417)
Work downtime costs because of continuing training	297 (1,113)	313 (1,190)	225 (694)
Induction costs, of which:	8,930 (13,160)	9,444 (13,772)	6,764 (9,909)
Lower performance in the induction period (skilled worker recruited)	3,566 (5,390)	3,664 (5,555)	3,151 (4,615)
Personnel costs for induction	5,364 (8,943)	5,779 (9,451)	3,612 (6,071)
Total recruitment costs	10,454 (14,267)	11,084 (14,944)	7,800 (10,567)
n	2,874	2,511	363

Explanation: Weighted average value in the first row each time, standard deviation in brackets in each second row.
Source: BIBB-CBS 2017/18

recruitment costs of firms is based on information supplied by 2,874 firms (2,192 providing training and 682 not offering training) that have recruited skilled workers from the labour market over the past years.[14]

Average overall costs of recruiting skilled workers were relatively high at €10,454 per skilled worker recruited (cf. Table 4). However, recruitment costs were less than €5,000 at about 50 per cent of firms. Employing a former apprentice permanently upon completion of training enables a firm to realise savings in recruitment costs which correspond to just under two thirds of total net costs for an average training duration of three years. Analysis of the individual components of recruitment costs shows that a material impact is exerted by induction costs in particular and above all by the expense incurred in respect of employees involved in the induction process. These induction costs made up just over half of total recruitment costs (€5,364). However, the temporary lower level of productivity of new skilled workers accounted for €3,566 and was also an important cost factor. Compared to this, relatively low costs were incurred for the application process to recruit skilled workers, which also includes advertising costs, personnel costs for the selection procedure and costs of external advisors and agents. Total costs in this regard were €1,003 and constituted only around ten per cent of all recruitment costs. Average costs of continuing training were also lower than induction costs. These take into account both direct continuing training costs (e.g. fees/subscriptions for courses) and costs of absence from the workplace.

Significant differences according to aspects such as region and firm size are revealed if we calculate recruitment costs by various structural characteristics (cf. Tables 4 and 5). Recruitment costs were significantly lower in eastern Germany than in western Germany. This applies both to overall costs and to the individual sub-groups. The lowest differences were identified with regard to lower performance in the induction period. Regional variance in recruitment costs is, however, still low compared to differences by firm size categories. Both overall costs and costs for the individual sub-groups rise in line with firm size. Particularly large differences are shown by a comparison between small firms with fewer than ten employees and large firms with 500 employees or more. In the case of the latter, average recruitment costs per skilled worker recruited were €23,717. This is more than twice as high as the corresponding figure for the smallest category of firms, which was €9,503.

Average recruitment costs for firms providing training were just over €900 lower than for firms not offering training (cf. Table 6). This was even more marked in western Germany, where the difference was around €1,300. The difference in east Germany was only €237. No clear picture emerged with regard to firm size categories. Firms with fewer than 50 employees and not offering training needed to expect significantly higher recruitment costs than similar sized firms providing training. In the case of firms with between 50 and 499 employees, those providing training bore higher recruitment costs. The

14 Unlike in previous surveys, an average value for all skilled workers recruited was not collected. Human resources acquisition costs for the most recent skilled worker recruited by the company in the relevant occupation were taken as a basis instead.

Table 5: Recruitment costs for a new skilled worker by types of cost and firm size categories (in €)

	Total	1 to 9 employees	10 to 49 employees	50 to 499 employees	500 employees or more
Application procedure, of which:	1,003 (2,080)	659 (1,605)	1,537 (2,503)	2,052 (3,044)	2,871 (3,890)
Advertising costs	358 (737)	239 (584)	525 (856)	782 (1,081)	1,309 (1,413)
HR costs for the application procedure	396 (642)	281 (452)	591 (865)	677 (793)	835 (968)
Costs of external advisors	249 (1,481)	138 (1,104)	421 (1,873)	594 (2,369)	727 (2,853)
Continuing training during the induction period, of which:	521 (1,691)	411 (1,005)	685 (2,546)	871 (2,298)	1,345 (2,230)
Costs of continuing training	225 (817)	149 (448)	359 (1,280)	379 (977)	682 (1,220)
Work downtime costs because of continuing training	297 (1,113)	262 (693)	327 (1,624)	492 (1,661)	663 (1,227)
Induction costs, of which:	8,930 (13,160)	8,433 (12,909)	9,533 (12,615)	10,664 (15,103)	19,502 (33,508)
Lower performance in the induction period (skilled worker recruited)	3,566 (5,390)	3,377 (5,033)	3,853 (5,750)	4,129 (6,837)	5,166 (7,665)
Personnel costs for induction	5,364 (8,943)	5,056 (8,957)	5,680 (8,057)	6,535 (9,719)	14,336 (26,923)
Total recruitment costs	10,454 (14,267)	9,503 (13,565)	11,754 (14,448)	13,587 (16,692)	23,717 (34,896)
n	2,874	646	1,157	880	191

Explanation: Weighted average value in the first row each time, standard deviation in brackets in each second row.
Source: BIBB-CBS 2017/18

Table 6: Recruitment costs for a new skilled worker at firms providing training and firms not offering training by region and firm size categories (in €)

	Firms providing training	Firms not offering training
Region		
Eastern Germany	7,475 (13,276)	7,712 (10,105)
Western Germany	10,098 (13,013)	11,373 (15,165)
Firm size category		
1 to 9 employees	7,758 (11,937)	10,058 (13,966)
10 to 49 employees	9,102 (11,383)	12,977 (15,609)
50 to 499 employees	13,957 (15,616)	12,138 (14,084)
500 employees or more	18,659 (25,739)	Not available*
Total	9,732 (13,078)	10,633 (14,355)
n	2,192	682

Explanation: Weighted average value in the first row each time, standard deviation in brackets in each second row.
* No evaluation for this group due to the fact that the sample size is too small
Source: BIBB-CBS 2017/18

difference in this instance was around €1,800, lower than the differences in favour of firms providing training in the two other firm size categories (difference of €2,300 for the smallest category of firms and of €3,875 for small firms). As far as firms providing training were concerned, recruitment costs rose in line with firm size. For firms not offering training, the highest recruitment costs were recorded by firms with between ten and 49 employees.[15]

The reason why firms providing training incur lower recruitment costs could be that training acts as a positive signal to potential applicants (cf. e.g. Backes-Gellner/Tuor 2010; Sadowski 1980). Firms which provide initial and

15 No evaluations were carried out for companies with 500 employees or more not offering training because the sample size was too small.

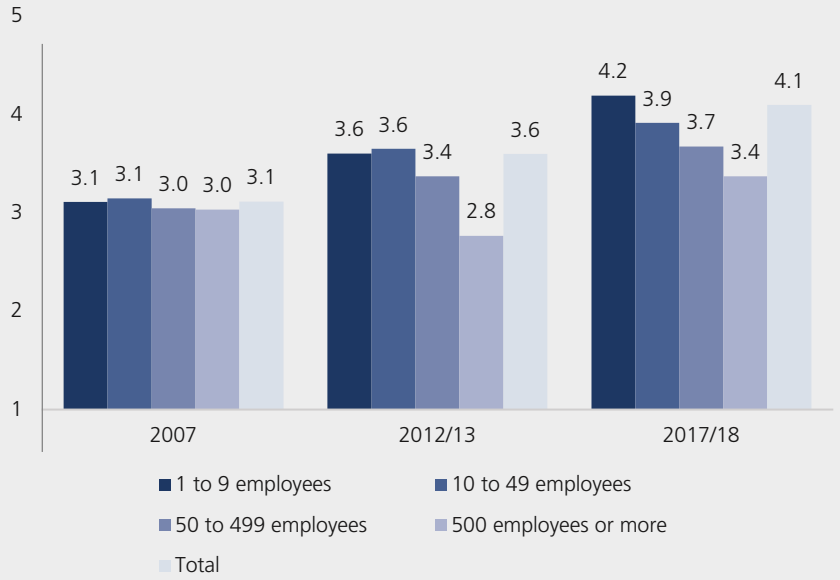
continuing training tend to offer better working conditions than firms which do not do so. If skilled workers were more likely to apply for jobs at firms which are actively involved in initial and continuing training, such firms would have a wider selection and would be able to choose skilled workers who are a good match for the firm and therefore less expensive to induct. This would have a cost-reducing effect as induction costs account for a major part of human resources acquisition costs.

The survey results presented in this section permit the conclusion that the saving of recruitment costs at least compensate for a large part of training costs as long as the firm permanently employs its own apprentices. The following sections look at the skilled worker situation on the labour market and discuss the strategy adopted by firms in terms of employing those who have completed training on a permanent basis and the retention of former apprentices within the firm.

The regional skilled worker situation has become more difficult – especially for small firms

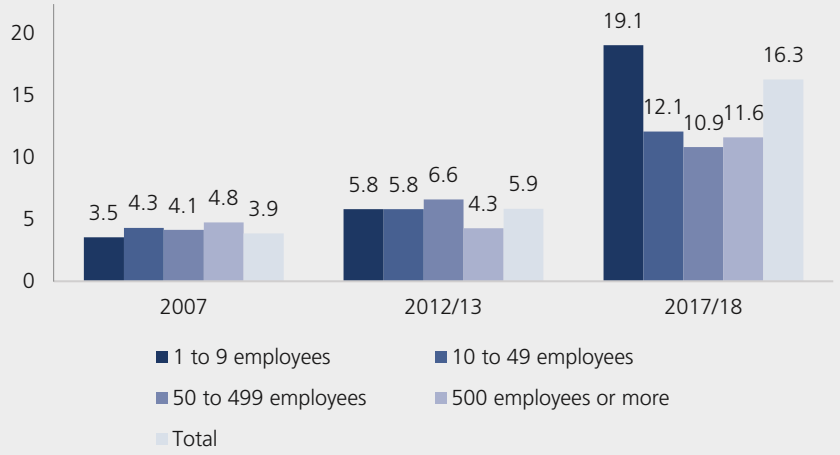
In the last three cost-benefit surveys (2007, 2012/13, 2017/18), both firms providing training and those which did not were each requested to give an assessment of the skilled worker situation on the regional labour market. They were asked to use a five-point scale ranging from 1 (very good) to 5 (very poor) to judge the availability of suitable skilled workers in a certain training occupation in their region. It was revealed that more and more firms feel that the skilled worker situation on the labour market relevant to them is difficult (cf. Figure 6). The average score for 2007 was 3.1. By 2017/18, this had clearly declined to 4.1. The situation has developed to varying extents for firms in different size categories. In 2007, small, medium-sized and large firms all still arrived at a similar appraisal of their situation. Average assessments were in the middle of the response scale. In overall terms at the time, firms neither assessed their skilled worker situation as being very good (point 1 on the scale) nor as very poor (point 5). The gap between the firms had widened by 2017. The smallest category of firms and small firms now evaluated their skilled workers

Figure 6: Assessment of the skilled worker situation by survey years and firm size categories (scale from 1 = very good to 5 = very poor)



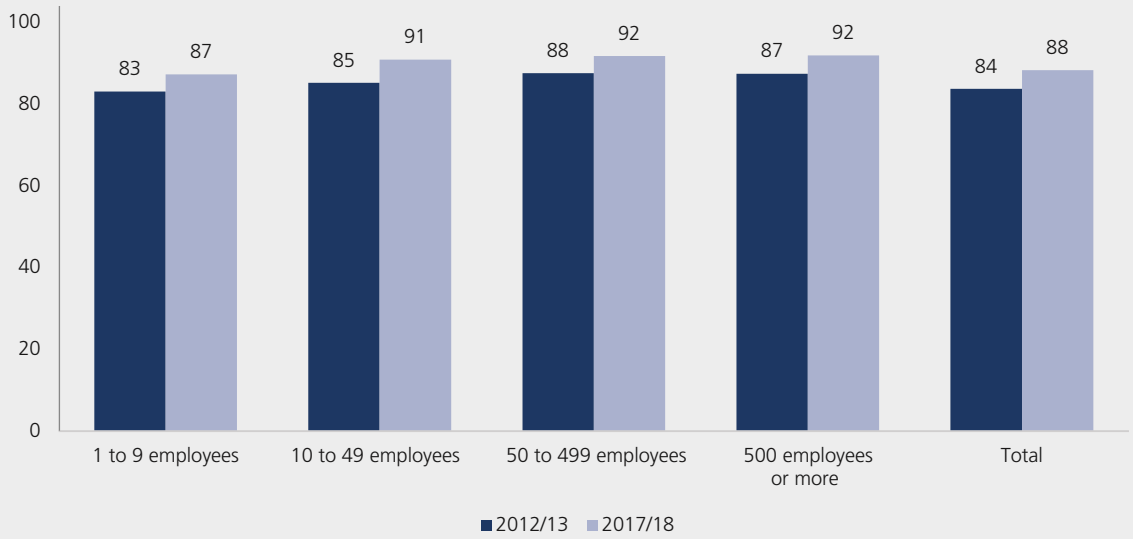
n = 3,360 (2007), 3,681 (2012/13), 3,813 (2017/18)
Source: BIBB-CBS 2007, 2012/13 and 2017/18

Figure 7: Recruitment of skilled workers – vacancy period in weeks by survey years and firm size categories



n = 3,069 (2007), 3,208 (2012/13), 3,103 (2017/18)
Source: BIBB-CBS 2007, 2012/13 and 2017/18

Figure 8: Average capacity utilisation for production of goods and services at a firm by survey years and firm size categories (in %)



n = 3,751 (2012/13), 3,858 (2017/18)
Source: BIBB-CBS 2012/13 and 2017/18

situation as being significantly worse, awarding average scores of 4.2 and 3.9 respectively. The average evaluation of large firms also fell, but not as sharply.

Evaluation of the skilled worker situation also correlates with the period of time during which a job vacancy cannot be filled. In the BIBB surveys, this vacancy period is defined as the time between the announced and actual recruitment date. A vacancy creates costs for the firm because it may not be possible to accept or execute orders (in a timely manner). These costs are not incurred if apprentices progress to permanent employment, and this may therefore be viewed as a benefit of training. No monetary calculation is possible within the scope of the surveys since this would involve considerable additional questioning.

Whereas the vacancy period in 2007 was only 3.5 weeks (smallest firms) or 4.8 weeks (large firms), a significant rise took place between the years 2012/13 and 2017/18 in particular. In the case of the smallest firms, the period even more than tripled (cf. Figure 7). In the most recent survey, the average search duration before training and non-training firms were able to fill a vacancy for a skilled worker was 16.3 weeks, i. e. around four months. It is particularly noticeable that the smallest firms with fewer than ten employees searched significantly longer. Their vacancy period was 19.1 weeks or almost five months. This was an average of nearly seven weeks more than firms in other size categories.[16]

The results relating to the labour market situation and to the time needed to fill vacancies also describe a publicly perceived trend that acquisition of skilled workers is becoming increasingly difficult and that the position has exacerbated significantly over recent years.

Positive economic development in many sectors is a possible cause of the shortages of skilled workers being reported. In 2017 as opposed to the 2012/13 survey, firms across all size categories declared higher average levels of capacity utilisation for the production of goods and services (cf. Figure 8).[17] Other factors which could play a part are the low rate of unemployment resulting from good economic development together with the unfavourable applicant situation associated with this and the demographic shift which will mean that many skilled workers will enter retirement over the coming years. A skilled worker situation which is already difficult is being further exacerbated by the circumstance that young adults are increasingly more likely to enter higher education rather than dual training (cf. e. g. Risius/Malin/Flake 2017) and that fewer young people are becoming available to fill the skilled worker jobs made vacant.

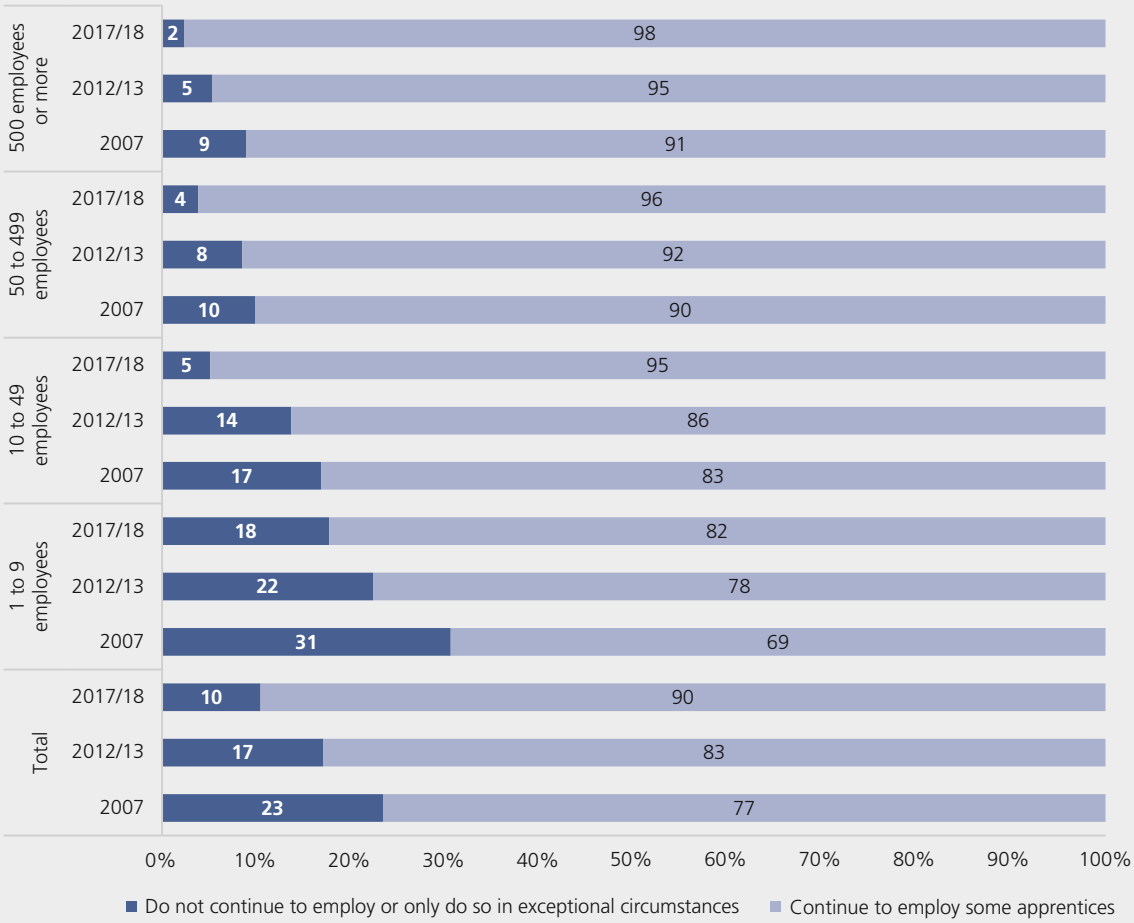
16 This finding maps those to emerge from other surveys. An analysis of the skilled worker shortage carried out by the Federal Employment Agency shows that an increase in the vacancy period has been discernible since 2014 and is still currently ongoing (BA 2019). Data from the BIBB Establishment Panel on Training and Competence Development also indicated a rise between 2016 and 2018 in the proportion of companies which were unable to fill at least one skilled worker position offered (cf. Mohr/Weis 2020).

17 Capacity utilisation was not included in the 2007 survey.

Firms are adapting their strategy in respect of providing permanent employment to those who have completed apprenticeship training

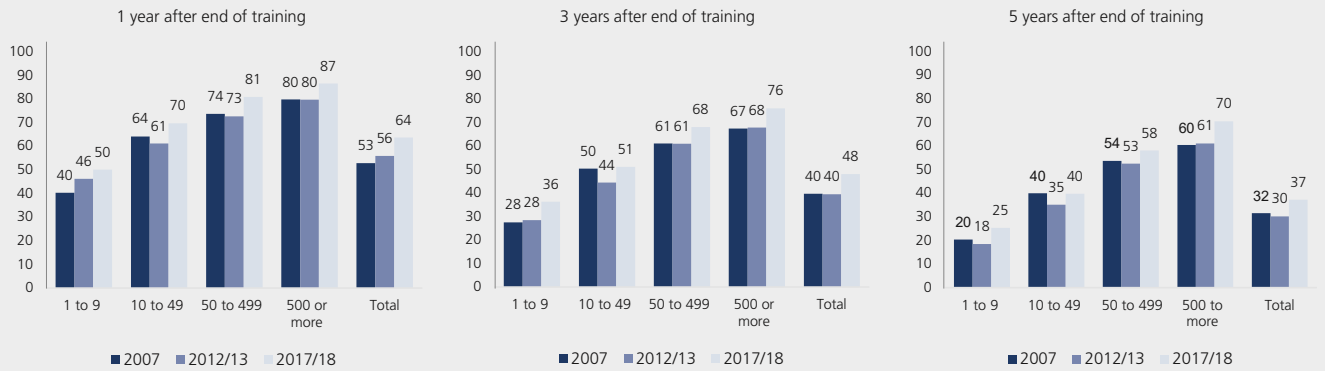
More and more firms are providing training with the intention of employing at least some of these apprentices upon completion of training (cf. Figure 9). When asked which training strategy their firm generally adopted within the selected occupation with regard to employing apprentices permanently after completion of training, a clear majority of firms in all survey years responded that they wished to continue to employ some or even all apprentices. The percentage rate of firms not seeking to employ apprentices permanently upon completion of training has declined significantly over the years. This decrease applied to all firm size categories. In the smallest category of firms with fewer than ten employees, 31 per cent of all firms in the 2007 survey were not intending to employ apprentices permanently upon completion of training. By the 2017/18 survey year, this proportion had fallen to 18 per cent. The corresponding figure for firms with ten to 49 employees also declined significantly from 17 per cent in 2007 to five per cent now. At medium-sized and large firms in 2007, the proportions of firms not wishing to employ apprentices permanently upon completion of training were ten and nine per cent respectively. In 2017/18, these rates were only four per cent and two per cent. The strategy in respect of permanently employing apprentices upon completion of training adopted by the smallest category of firms with fewer than ten employees differed significantly from that pursued by larger firms. One reason for this could be the higher risk of failure to retain workers. Smaller firms include this into their strategy from the outset and are therefore not as fixated as large firms on employing apprentices permanently upon completion of training. Nevertheless,

Figure 9: Strategy of firms providing training in respect of employing apprentices permanently upon completion of training by survey years and firm size categories (proportion in %)



n = 2,964 (2007), 3,020 (2012/13), 3,041 (2017/18)
Source: BIBB-CBS 2007, 2012/13 and 2017/18

Figure 10: Retention of former apprentices at the firm which provided training one, three and five years after completion of training by survey years and firm size categories (proportion in %)



n = 2,523–2,665 (2007), 2,690–2,857 (2012/13), 2,586–2,716 (2017/18)*
* Different sample sizes depending on retention point because firms which have not been providing training for so long were not surveyed.
Source: BIBB-CBS 2007, 2012/13 and 2017/18

a growing proportion of firms in the smallest size category were endeavouring to employ apprentices permanently upon completion of training. This could represent a reaction to the increased demand for skilled workers.

The proportion of persons completing training who were still employed at the firm providing training one year after the end of training has risen over the years (cf. Figure 10). Nevertheless, there are considerable variances in accordance with firm size. Whereas in 2017/18 only one former apprentice in two at the smallest category of firms was still employed at the firm that had provided them with training one year later, large firms with 500 employees or more usually retain their apprentices upon completion of training. 87 per cent of all persons completing apprenticeship training at such firms were still employed there one year later. However, the retention rate has been falling over the years because of employees who choose to leave the firm. This decrease can be observed in all firm size categories. Between the first and fifth year following completion of training, between one fifth (large firms) and one half (smallest firms) of remaining former apprentices decided to terminate their contract of employment at the firm which had provided their training. This means that small firms only succeed in achieving long-term retention of a quarter of the workers they have trained. Large firms, on the other hand, are able to retain 70 per cent of their former apprentices for five years after completion of training.

The permanent recruitment of apprentices who have completed training by the firm providing training is a process which requires commitment both on the employer's side and on the part of the former apprentice. The employer must be willing to offer a permanent position and, as Figure 9 shows, this is mostly the case.

A probit regression is carried out on the basis of the firms providing training in three waves in order to be able to investigate any developments in the strategy adopted by firms in terms of employing apprentices permanently upon completion of training, whilst also controlling for structural characteristics. The dependent variable is whether a firm does not wish to take on apprentices who have completed training or only seeks to do so in particular circumstances (value 0) or whether a firm aspires to employ some or all such apprentices permanently upon completion of training (value 1, see Figure 9).

The regression results control for region and training sector and show that firms increase their intention to recruit former apprentices over the course of the years (cf. Table 7). In 2017/18, the likelihood that firms would wish to recruit apprentices into employment upon completion of training was 45 percentage points higher than in 2007. As already indicated above, one reason for this may lie in the economic situation and in the position on the labour market. Willingness to employ apprentices permanently upon completion of training is particularly marked at firms that are in a poor skilled worker situation. Deterioration on the skilled worker situation scale correlates significantly with an increased readiness to recruit apprentices permanently.

The regression further shows that this willingness to employ apprentices permanently upon completion of training rises in line with firm size. Firms in the

Table 7: Probit regression on the strategy adopted by firms in terms of employing apprentices permanently upon completion of training

Dependent variable: Employ at least some apprentices permanently upon completion of training	Coefficient	Standard error	p > z
Year (reference 2007)			
2012/13	0.16	0.05	0.00
2017/18	0.45	0.05	0.00
Skilled worker situation (1 = very good, 5 = very poor)	0.14	0.02	0.00
Firm size (reference 1 to 9 employees)			
10 to 49 employees	0.50	0.04	0.00
50 to 499 employees	0.78	0.05	0.00
500 employees or more	0.94	0.09	0.00
R^2	0.11		
n	8,724		

Cluster-robust standard errors and weightings were used. We controlled in addition for region (Eastern and western Germany) and economic sector (not shown).
Source: BIBB-CBS 2007, 2012/13 and 2017/18

smallest size category are significantly less likely than firms in all other size categories to wish to employ apprentices permanently upon completion of training. Firms with 50 or more employees are significantly more likely than firms with between ten and 49 employees to take on employees permanently. The contrast between firms with 500 employees or more and the smallest category of firms with fewer than ten employees is particularly high with regard to pursuing this intention.

▸ Summary and conclusion

The results of the current BIBB Cost-Benefit Survey for the 2017/18 training year show that many firms in Germany are continuing to invest in their own training. Although around two thirds of gross costs are covered by the productive output of the apprentices themselves, most firms providing training incur considerable costs. An average consideration across all firms is, however, insufficient. Gross costs, returns and therefore also net costs vary sharply according to occupation, training sector, region and firm size. A comparison which includes various waves of the BIBB surveys indicates that average net costs rose during the years from 2007 to 2017/18 but that these increases are not excessive, particularly in relation to the previous survey conducted in 2012/13. The question which arises in overall terms, however, is why firms are prepared to bear training costs in the first place.

One possible explanation is the motive of using training as a vehicle to acquire skilled workers. The results of the study also reveal that firms are obliged to accept high levels of cost when obtaining qualified staff from the external labour market. Induction of skilled workers is particularly costly for firms which recruit in this way. These costs cease to apply if firms employ apprentices permanently upon completion of training and are thus able to realise a high level of benefit by saving personnel recruitment costs. This result has additional significance to the extent that the skilled worker situation has clearly escalated over recent years. Growing numbers of firms are reporting shortages of skilled workers. The time needed to recruit qualified staff has significantly increased for small firms especially. Possible causes of this include the healthy economic situation at the time when the survey took place, demographic development and the associated shortage of skilled workers on the labour market. The consequence of this is that it is possible to identify an adaptation of strategy towards increased permanent employment of apprentices upon completion of training, and this is reflected in actual instances of this approach. A regression confirms the conclusion that the situation is particularly difficult for small firms.

In overall terms, the analyses contained in the present report show that firms still have strong financial incentives to cover skilled worker needs via their own training despite the increase in training costs. In light of existing demographic and economic trends and the associated difficulties in acquiring skilled workers, the expectation is that many firms will continue to find it attractive to provide their own training. However, small firms and the smallest category of firms making training investments face the particular and considerable risk that they will not be able to retain the skilled workers they have trained and will thus be unable to amortise the investments they have made. For this reason, general conditions relating to training should be designed in such a way so as not to place too heavy a burden on this group.

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The President
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Editorial Staff: Christian Gerhards, Elisabeth Krekel, Britta Nelskamp (V.i.S.d.P.)
Questions to the content: schoenfeld@bibb.de

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