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Apprenticeship training or external recruitment of skilled workers – what costs should firms expect?

Results of the 2022/2023 BIBB Cost-Benefit Survey

The shortage of skilled workers remains one of the dominant issues on the labour market. One way to counter this shortage at the firm level is to invest in apprenticeship training in one of more than 320 dual training occupations. This report uses the 2022/2023 BIBB Cost-Benefit Survey to show how high these investments are, what benefits they bring for firms, and what the alternative of recruiting skilled workers from the external labour market costs. Based on information from over 3,000 firms providing training and over 1,000 firms not providing training, the study presents gross costs, benefits of apprentices' productive contributions and net costs of apprenticeship training, recruitment costs for skilled workers, and other key figures. The results are shown for Germany as a whole and in disaggregated form by firm size, training sector and region. Developments over the last 15 years are also analysed.¹

► Context of the 2022/2023 BIBB Cost-Benefit Survey

The Federal Institute for Vocational Education and Training (BIBB) conducted its seventh survey of the costs and benefits of apprenticeship training (BIBB-CBS 2022/2023) for the 2022/2023 training year. Over all, the trends in the labour and training market, which were observable in the previous survey for the 2017/2018

¹ The project group would like to thank the market and social research agency Verian, the Institute for Employment Research, the Federal Ministry of Education and Research and Samuel Mühlemann, Marco Caliendo, Jan Nimczik und Alexander Gehret for their support in conducting the survey and for the productive networking which took place regarding the survey and evaluation questions. Our deepest gratitude, however, must be reserved for the firms which took part. It would not have been possible to implement the project without their commitment.

training year, have continued until the current survey. The training market has been facing a declining number of training contracts since 2008. The number of contracts decreased further between 2017 and 2022, especially in the training sector of trade and industry (cf. KROLL 2024). The share of firms providing training also decreased during this period (from 19.8% in 2017 to 18.9% in 2022; cf. MOHR 2024). Many firms wished to offer training but were unable to fill any or all of their training places (cf. e.g. FITZENBERGER/LEBER/SCHWENGLER 2024; WELLER et al. 2024).

The lack of skilled workers on the labour market is a key problem, both for the economy as a whole and for the individual firms. The gap in the number of qualified skilled workers widened to more than 600,000 in 2022 (cf. BURSTEDDE/TIEDEMANN 2024). Other studies show similar results (cf., e.g., on the skilled worker requirement and the vacancy rate in 2022 BENNEWITZ et al. 2023). At the same time, the markets were significantly affected by the Coronavirus pandemic, by the Russian war of aggression against Ukraine and its attendant energy crisis, by high inflation rates, and by an overall stagnation in economic growth. Thus, several recent developments may have influenced the overall (im)balance in the labour and training markets.

The most important pathways which firms can use to cover their skilled worker demand are to provide apprenticeship training and to recruit workers via the external labour market. In addition to the availability of skilled workers and apprentices, the respective costs for recruitment and training play an important role in choosing the most suitable option. The results of the BIBB-CBS show how the costs (investments) and benefits of apprenticeship training and of skilled worker recruitment play out in the complex economic situation

seen in 2022/2023. It is the only survey in Germany providing extensive data on this topic.

This BIBB Report will begin by providing an overview of the training costs and benefits in the 2022/2023 training year. These will be presented for the total number of apprentices and in differentiated form according to various characteristics such as regions, firm size categories, occupational groups, training sectors, and years of training. The report then portrays the development over the past 15 years. Data from the BIBB Cost-Benefit Surveys of 2007 (cf. SCHÖNFELD et al. 2010), of 2012/2013 (cf. SCHÖNFELD et al. 2016) and of 2017/2018 (cf. WENZELMANN/SCHÖNFELD 2022) are used for this purpose. The report then analyses aspects of the longer-term benefits of training in terms of recruitment costs, the firm's hiring strategy and the extent to which trainees remain in the firm after completing their training.

Methodological explanations for the 2022/2023 Survey

The BIBB-CBS 2022/2023 was conducted between June 2023 and September 2024 by Verian (previously known as Kantar Public). The sample used was taken from the Federal Employment Agency firm database, which includes all firms with at least one employee subject to mandatory social insurance contributions. Hence, it fulfils the requirements of representativeness, which is of crucial importance for the validity of the data to be collected. A methodological mix was deployed for the survey for the first time. Verian conducted personal computer-assisted interviews (on site or by telephone) with 992 firms providing training and with 208 firms not providing training. 2,215 firms providing training and 818 firms not providing training completed an identical online questionnaire.

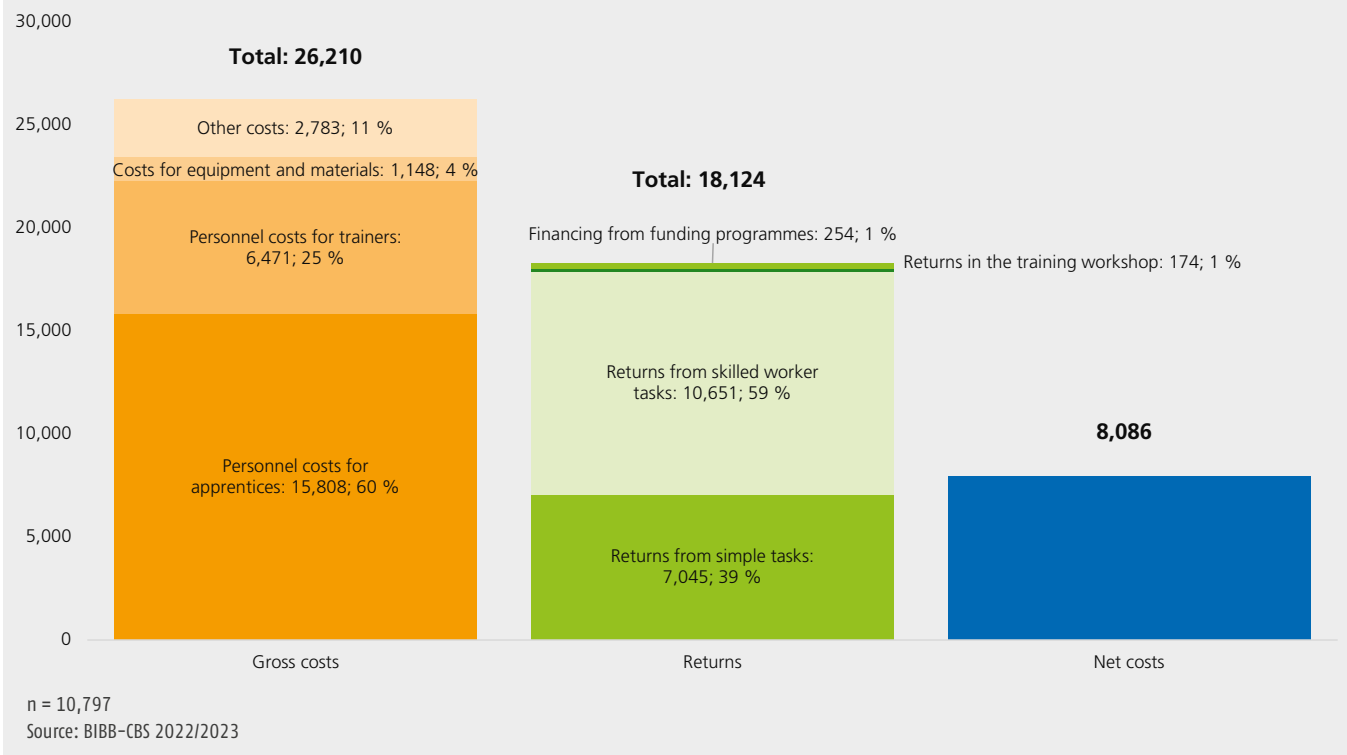
The respondents were the members of staff responsible for training or human resources management. In the case of smaller firms, these persons were frequently the firm owners. The average duration of interviews for firms providing training was 57 minutes as opposed to 30 minutes for firms not offering training.

Questions relating to the costs and benefits of firm-based apprenticeship training or the costs for recruiting skilled workers were each posed for one occupation in the dual system in which training takes place in accordance with the rules set out in the Vocational Training Act or the Crafts and Trades Regulation Code. If a firm provided training in more than one occupation, the occupation was selected randomly. 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, region and training sector. A total of 10,797 apprentices from the 3,207 firms providing training were included in the calculations. The results state the average gross costs, returns and net costs per apprentice that arose at one firm during the 2022/2023 training year.

A firm-level dataset was used for time comparisons and evaluations of skilled worker recruitment, retention of graduates, and for the assessments of the benefits of training. Weightings for the firm dataset were also determined iteratively via marginal distributions of firm size category, region, economic sector, and training activity (for more detailed explanations of the methodology, see WENZELMANN/SCHÖNFELD 2025).

Figure 1: Gross costs, returns and net costs per apprentice in the 2022/2023 training year (in €; differentiation of the gross costs and returns additionally in %)



► 69 percent of gross costs are covered by returns

In the 2022/2023 training year, firms providing training incurred average yearly gross costs (averaging all years of training) in the amount of €26,210 per apprentice (cf. Figure 1). They also generated returns as a result of the work performed by apprentices. This productive output added up to a value of €18,124. In overall terms, therefore, 69 percent of the gross costs were covered by these returns.² This left net costs of €8,086, the average sum invested by a firm across all training occupations per apprentice and per year.

The calculation of these costs is based on the further development of a model which was first used in a firm survey in the 1970s by the EXPERT COMMISSION

ON COSTS AND FINANCING OF VOCATIONAL EDUCATION AND TRAINING (SACHVERSTÄNDIGENKOMMISSION KOSTEN UND FINANZIERUNG DER BERUFLICHEN BILDUNG 1974). Gross costs and returns are comprised of different cost values which are surveyed individually at the firms and collated in a cost model (on the methodology of the costs and returns calculation, cf. WENZELMANN/SCHÖNFELD 2025).

Gross costs include all material and personnel costs incurred by a firm for apprenticeship training. Four cost blocks are differentiated (cf. Figure 1). In the 2022/2023 training year, **personnel costs for apprentices** made up the largest share (60%). Firms spent an average of €15,808 in this regard. Gross training allowances and statutory social benefits accounted for €11,601 and €2,900, respectively. Around 89 percent of apprentices received at least one social benefit paid by their firm on the basis of a collective wage agreement

or voluntarily, e.g. a vacation pay, a Christmas bonus or travel expenses. These payments totalled €1,307 per apprentice.

Personnel costs for trainers (€6,471 or a share of 25%) were the second largest cost factor. This calculation encompasses the time needed for the support and training of the apprentices at the firm and the gross hourly wages plus the ancillary human resources costs of the various employee groups involved with training. Training input may be supplied by full-time, part-time and external trainers. Full-time trainers whose core task consists of the delivery of training are mainly deployed by larger firms with many apprentices. Four percent of firms employed full-time trainers in the 2022/2023 training year. Costs were €422 across all firms providing training. Part-time trainers only perform training activities intermittently alongside their actual tasks at the firm. However, their training

² The degree of coverage is thus the same compared to the 2017/2018 survey (69%) and the 2012/2013 survey (70%).

performance is only relevant for the calculation of training costs if the employees are restricted in their actual activities as a result, i.e. their productivity decreases. In the case of training times of part-time trainers, the decrease in productivity during these periods is also recorded.³ Costs of €5,981 per apprentice and year were incurred for part-time trainers. External trainers were deployed at four percent of firms. An average of €69 per apprentice and year was spent on costs for fees, travel and overnight accommodation for this external staff.

Costs for equipment and materials make up only a small part of the gross costs (€1,148 or a share of 4%). This figure includes the costs for machines, tools, computers and all other equipment needed for training at the workplace which has been specifically procured for the apprentices. It further encompasses the costs for consumables required for practical purposes. Account is also taken of capital expenditure and costs for materials for any training workshop⁴ which may be in place at the firm and of the rent and equipment costs for training rooms that are used for internal firm teaching. The remaining category of **other costs** comprises chamber fees, costs for teaching

and learning materials, work and protective clothing, external courses, administration of training, and costs for filling a training place. These individual sums added up to a total of €2,783 (11%).

► Almost 60 percent of the returns were generated by skilled tasks

The fundamental characteristic of dual training is learning by doing. This means that learning and work are closely connected. Already during their training, apprentices produce goods or services which are economically useful to the firm and which lead to returns. Productive output may be generated at the workplace and in the training workshop. In 2022/2023, about one in ten firms received grants for at least one of its apprentices from Federal Government or federal state funding programmes, from the European Social Fund, from the Federal Employment Agency or from professional or sector associations. These grants are also 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 other 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. The tasks are evaluated in line with the wage costs of the relevant employee group. Because the productivity of apprentices carrying out more difficult skilled tasks is often lower than that of a skilled worker, account is also taken of the degree of performance achieved by the apprentices in comparison with an average skilled worker at

the firm. Individual surveys are conducted for each year of training since the degree of performance will usually improve during the course of training. If the degree of performance is 50 percent, for example, then only 30 minutes of the hourly wage cost of a skilled worker will be included in the calculation of the returns. The times during which apprentices create productive output in the training workshop is also evaluated on the basis of skilled worker wages whilst according consideration to degree of performance.

In the 2022/2023 training year, simple tasks accounted for 39 percent of returns at a total value of €7,045 per apprentice and year (cf. Figure 1). Skilled worker tasks accounted for a significantly higher proportion of 59 percent. They generated an average of €10,651. Returns in the training workshop and grants from various funding programmes each accounted for proportions of one percent and were of lesser importance. Compared to the last three Cost-Benefit Surveys, in which approximately half of the returns were distributed to simple and skilled worker tasks, respectively, a remarkable shift of the proportion towards skilled worker tasks occurred in the 2022/2023 training year. This was revealed both in the distribution of the returns and in the time allocations. In the 2017/2018 training year, for example, apprentices spent 45 days performing simple tasks and 50 days carrying out skilled worker tasks (cf. WENZELMANN/SCHÖNFELD 2022). By 2022/2023, the number of days spent on skilled tasks had risen to 65 whilst there had been a fall to 38 days for simple tasks. This suggests a need for more detailed analyses on the time structure of training.

³ This means, for example, that one hour is included in the cost calculation if the volume of hours is ten and decrease in productivity is ten percent. However, the full times are taken into account if part-time trainers concentrate entirely on training, i.e. do not deliver any productive output for the firm. For evaluations of time resources of trainers using data from the BIBB-CBS 2017/2018, cf. SCHÖNFELD/WENZELMANN/PFEIFER 2024.

⁴ A training workshop is defined in the survey as a dedicated institution located within the firm and used for training purposes. The training workshop is separated from normal workplaces both spatially and organisationally. It provides a venue where apprentices are able to learn independently from the production process. The definition does not extend to inter-firm vocational training centres, training workshops at vocational schools or training rooms at the firm, which are exclusively used for theoretical teaching. By this definition, six percent of firms providing training had a training workshop in place. Just under a fifth of apprentices were instructed in a training workshop.

► High levels of investment in large firms, in the public sector, and in firms with a training workshop

The values previously presented are average figures per apprentice and year of training. However, all values exhibit a high degree of variance between the firms. In order to illustrate these, the following sections will differentiate between gross costs, returns and net costs by various firm-related characteristics (region, firm size, training sector, firms with and without a training workshop) and also by occupational characteristics⁵ (occupational group, duration of training), which have already proven to be important influencing variables for the variance in previous CBS. Costs and benefits may, however, also vary between individual apprentices within a firm because, for example, of differences in performance. Since data cannot be collected separately for every apprentice, an average consideration by years of training was carried out for firms with more than one apprentice. This approach allows differences by years of training to be taken into account in the cost calculation.

We will begin, however, with an overview of the distribution of net costs per apprentice across all firms in the 2022/2023 training year (cf. Figure A2 in the appendix). On average, firms invested net costs in the amount of €8,086. A broad spread was, however, revealed. Returns exceeded gross costs for about 26 percent of apprentices. In these cases, the training not only covered costs but actually generated net benefits. Nevertheless, some firms invested heavily in training. Annual net costs of more than €20,000 were

incurred for around 16 percent of apprentices. The medium and long-term benefits of retaining apprentices permanently upon completion of training should be particularly indicated for firms with high net costs. This will be addressed later.

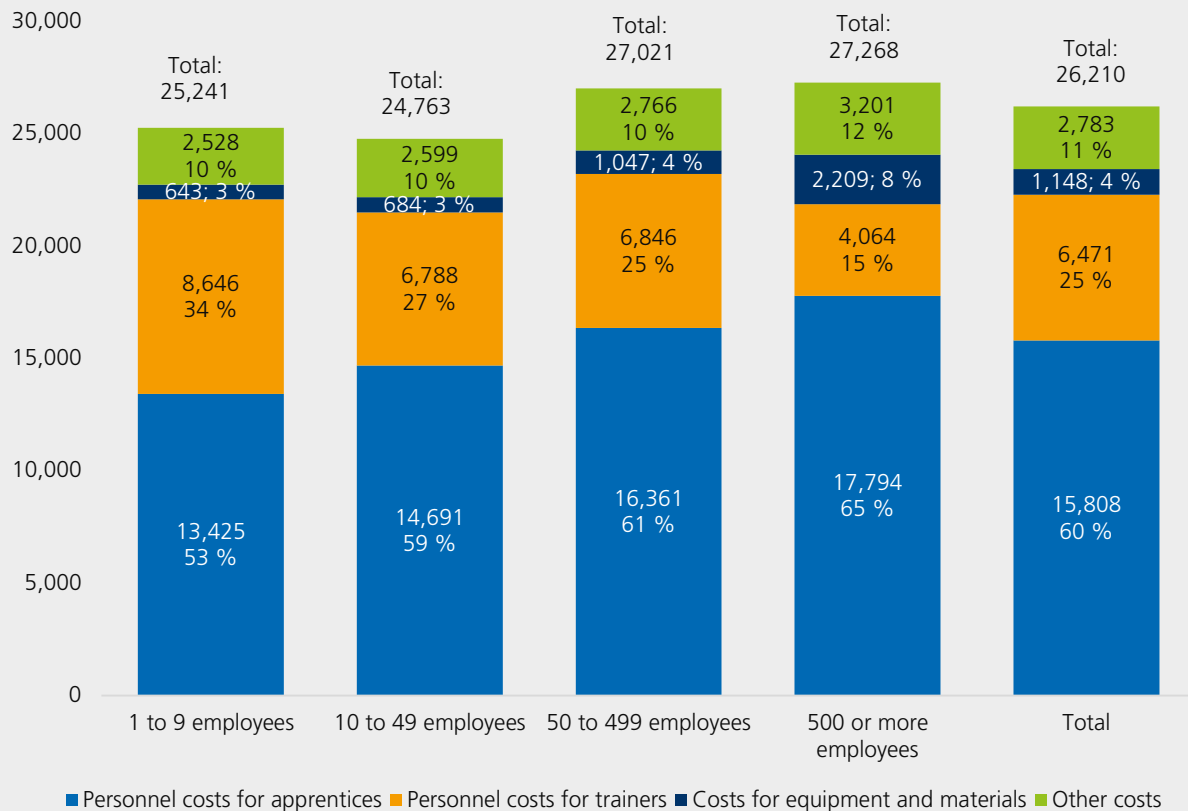
Average training costs are influenced by different regional firm, sectoral and wage structures, by the supply of qualified workers, by regional training place demand and by training place supply (cf. SCHUSS/CHRIST/MILDE 2023 on the situation in 2022). Four regions were formed for the following evaluations (cf. Table 1). The highest gross costs of €27,168 were incurred in southern Germany. Costs were around €800 lower in western Germany and about €2,000 lower in eastern and in northern Germany. Returns in northern Germany (€18,882) and in southern Germany (€18,637) were over €1,000 higher on average than in western Germany (€17,550) and in eastern Germany (€17,516). The differences can be explained to some extent by the level of wages and training allowances. These were about ten percent lower in eastern Germany than in southern Germany, the region with the highest allowances. The gap between northern and western Germany and southern Germany was around four percent. These differences exert impacts on all types of costs and returns which are determined by personnel costs. In addition, the times during which apprentices are performing productively in the workplace also play a major role for returns. During the 2022/2023 training year, apprentices were on average deployed productively for 103 days. Apprentices in northern Germany were slightly more likely to be deployed productively (109 days), whereas in the other regions the values were almost at the same level ranging from 102 to 104 days. An explicit consideration of time spent on skilled work tasks reveals scarcely any differences

(respectively 67 days). The only slight outlier was eastern Germany, where the corresponding figure was 58 days. The highest overall net costs measured per apprentice in the 2022/2023 training year were in western Germany (€8,805). A slightly lower figure of €8,531 was recorded for southern Germany. Overall net costs in eastern Germany were €7,620, around €500 below the average value for Germany as a whole. A significantly lower figure of €6,198 was recorded for northern Germany.

A consideration of the gross costs and returns in the different firm size categories reveals a division. Gross costs were around €25,000 at micro and at small firms. They were around €2,000 higher at larger firms. The latter also exhibited the highest returns (approximately €19,000 for medium-sized firms and €18,433 for large firms). The corresponding figures for micro firms and for small firms were €16,978 and €17,403, respectively. Net costs varied accordingly, ranging from €7,360 at small firms to €8,835 at large firms. Wages and training allowances as well as the productive output of apprentices played an important role with regard to average values by firm size categories. Depending on the employee group, wages and training allowances at large firms were between 20 and 30 percent higher than at the smallest firm-size category. Nevertheless, apprentices at large firms spend less time on productive tasks than their counterparts at smaller firms. One of the reasons for this is that parts of training are conducted in training workshops at large firms. A differentiated consideration of the distribution of gross costs shows that personnel costs for apprentices accounted for a larger proportion of these costs at large firms (65%; cf. Figure 2). One conspicuous aspect at micro firms, on the other hand, is the 34 percent proportion relating to personnel costs

⁵ Evaluations by training occupations will follow in later publications and are presented in tabular form at <https://www.bibb.de/de/11060.php> (status: 15/05/2025).

Figure 2: Distribution of gross costs per apprentice in the 2022/2023 training year by types of cost and firm size (in €; proportions in %)



n = 10,797

Source: BIBB-CBS 2022/2023

for trainers. Also, when expressed in absolute terms, these costs were significantly higher than those incurred at larger firms (€8,646). One possible explanation is that a one-to-one support may be assumed at the micro firms with only one or very few apprentices. At larger firms, on the other hand, trainers are able to instruct several apprentices at the same time. At micro firms, the proportion of managers involved in training was also significantly higher than at larger firms.

A consideration by training sectors⁶ showed that the highest gross costs by some distance were measured in the public sector (€28,115) and in trade and industry (€27,801). A figure of

around €25,000 was recorded both for agriculture and the liberal professions. Gross costs in the craft trades were significantly lower at €23,314. The low average training allowances paid in the craft trades sector were a particular contributory factor in this regard. In the 2022/2023 training year, apprentices received just under a fifth less than their counterparts in the public sector. As far as returns were concerned, the training sectors of trade and industry, agriculture and the liberal professions were very close together. A figure above €19,000 was measured in each of these three cases. Apprentices generated returns of just under €16,000 both in the public sector and in the craft trades. One of the reasons for this is that apprentices in these areas are less likely in overall terms to have carried out productive tasks than in the other train-

ing sectors. They are in particular also less likely to have been assigned skilled worker tasks. The highest net costs by some distance (€12,120) were therefore recorded in the public sector. Net costs in trade and industry (€8,511) were above the overall average of €8,086. The corresponding figure for the craft trades (€7,734) was just below the average level. The lowest net costs per apprentice and per year were recorded at firms in agriculture (€5,985) and in the liberal professions (€5,679) (cf. Table 1).

Training in a training workshop is usually associated with high costs. Alongside direct maintenance costs (e.g. for machines and equipment, routine repairs, practice materials, rent of the premises), higher costs are also incurred for the trainers deployed there. In addition

⁶ No evaluations for the sector of housekeeping because sample sizes were too low.

Table 1: Gross costs, returns and net costs per apprentice in the 2022/2023 training year by various characteristics (in €)

Characteristic	Gross costs	Returns	Net costs	n
Total	26,210 (10,046)	18,124 (8,879)	8,086 (12,741)	10,797
Region				
Northern Germany (Schleswig-Holstein, Hamburg, Lower Saxony, Bremen)	25,081 (8,302)	18,882 (9,359)	6,198 (11,972)	2,053
Western Germany (North Rhine-Westphalia, Hesse, Rhineland-Palatinate, Saarland)	26,355 (11,120)	17,550 (8,507)	8,805 (13,481)	3,640
Southern Germany (Baden-Württemberg, Bavaria)	27,168 (10,175)	18,637 (9,135)	8,531 (12,900)	3,225
Eastern Germany (Berlin, Brandenburg, Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt, Thuringia)	25,136 (8,575)	17,516 (8,487)	7,620 (11,102)	1,879
Firm size classifications				
1 to 9 employees	25,241 (10,262)	16,978 (8,577)	8,264 (11,842)	1,183
10 to 49 employees	24,763 (9,198)	17,403 (7,547)	7,360 (10,940)	2,650
50 to 499 employees	27,021 (10,859)	18,916 (8,917)	8,104 (13,430)	3,402
500 or more employees	27,268 (9,205)	18,433 (10,271)	8,835 (14,072)	3,562
Training sector*				
Trade and industry	27,801 (10,692)	19,290 (9,441)	8,511 (13,881)	6,047
Craft trades	23,314 (8,615)	15,580 (7,658)	7,734 (10,850)	2,339
Agriculture	25,376 (8,899)	19,390 (7,186)	5,985 (10,341)	282
Liberal professions	24,948 (8,900)	19,269 (7,606)	5,679 (11,606)	959
Public sector	28,115 (7,800)	15,995 (8,528)	12,120 (10,776)	1,167
Training workshop				
No training workshop	25,827 (10,051)	18,972 (8,637)	6,855 (12,103)	8,880
Training workshop	27,954 (9,840)	14,262 (8,945)	13,692 (14,011)	1,917
Occupational group				
Commercial occupations	27,357 (10,682)	20,120 (8,729)	7,237 (12,966)	5,201
Industrial occupations	25,373 (8,647)	17,088 (7,933)	8,284 (11,454)	1,927
STEM occupations	25,380 (9,866)	16,465 (9,065)	8,915 (13,053)	3,669

Note: weighted average value in the first row, standard deviation in brackets in the second row.

* Results for the training sector of housekeeping are not shown due to the low sample size.

Source: BIBB-CBS 2022/2023

to this, learning times spent in training workshops means that apprentices may be less likely to work productively and generate returns. For this reason, net costs at firms with a training workshop were almost twice as high as at firms without such a facility. Higher gross costs accounted for about a third of this difference, whilst two thirds were due to lower returns.

If we draw a distinction between commercial, industrial and STEM occupations (Science, Technology, Engineering, and Mathematics), commercial occupations are then shown to exhibit both the highest gross costs (€27,357) and the highest returns (€20,120). Gross costs were approximately at the same level in the industrial and STEM occupations, the returns were around €600 higher in the industrial occupations and hence, the net costs €600 lower. Net costs in the commercial occupations were the lowest with €7,237. Just under two thirds of apprentices in STEM occupations were completing a training programme of three-and-a-half years' duration.⁷ The particular characteristics of these cost-intensive occupations will be addressed in the next section, which deals with cost development by years of training. The half fourth year thus exerts a subduing effect on average values across all years of training. If comparability between the STEM, industrial and commercial occupations is increased by only using the first three years for the average calculation, it is revealed that STEM occupations have the highest net costs of just under €10,000. If this condition is applied, gross costs (€27,338) were approximately the same as in the commercial occupations. By way of contrast,

only a small change of plus €900 was shown with regard to 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. Firstly, firms are still heterogeneous, even within a group of characteristics. Secondly, parameters such as training allowances, wages and training organisation sometimes differ significantly between firms which are otherwise very similar.

► Strong increase in returns over the course of training

Up until now, an average consideration of costs and returns across all years of training has been presented. However, this conceals shifts and developments which occur over the course of training. Aspects which need to be borne in mind here include the statutorily prescribed increase in training allowances as well as greater deployment of apprentices for skilled worker tasks and changes in training organisation (e.g. via a decrease in learning and practice times). The duration of training prescribed in the training regulations depends on the time that is considered necessary for practising the vocational skills until they are mastered with confidence in the work process in the respective occupation.⁸

The two-year occupations cannot be evaluated due to low sample sizes. In the three-year occupations, there is only a relatively small difference in gross costs by years of training (cf. Figure 3). The lowest gross costs were in the second year of training. Personnel

costs for apprentices rose by about ten percent from the first to the second and from the second to third year of training. At the same time, personnel costs for trainers decreased. There was a significant increase in returns, which rose somewhat more between the second and third year than between the first and second year. The main reason for this, alongside a general growth in times during which apprentices are assigned productive tasks, is a strong increase in skilled worker tasks. Whereas apprentices were deployed to perform simple and skilled tasks with virtually the same frequency in the first year of training, skilled tasks accounted for just under two thirds of times in the second and third years of training. For this reason, net costs decreased significantly from €11,818 in the first year of training to €3,534 in the third year of training.

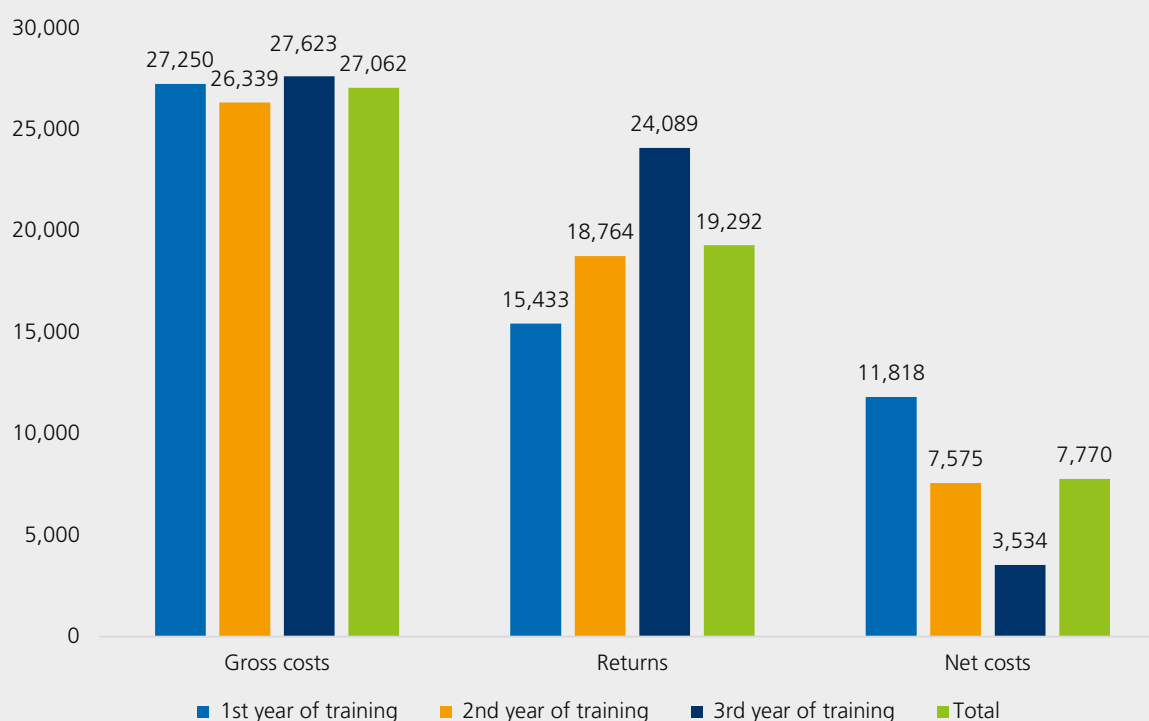
In the case of the three-and-a-half-year occupations,⁹ gross costs declined slightly from €27,384 in the first year of training to €26,135 in the third year (cf. Figure 4). There were virtually no differences between three-year occupations and three-and-a-half-year occupations in the amount of gross costs in the first two years of training. In the third year of training, gross costs in the three-and-a-half-year occupations were around €1,500 lower than in the three-year occupations. Returns also increased significantly over the course of training in the three-and-a-half-year occupations from €12,018 in the first year of training to €20,614 in the third year. They were, however, significantly lower than in the three-year occupations. The three-and-a-half-year occupations comprise almost exclusively STEM occupations. Training frequently

7 The maximum period of training in commercial occupations is three years. Only around one percent of industrial apprentices were completing a programme of training of three-and-a-half years.

8 Training can be shortened for apprentices with higher ability or for apprentices with prior learning. The duration of training stipulated per occupation in the respective training regulations forms the basis of assumption for the cost calculations each time.

9 Because the fourth year of training lasts for only six months, values cannot be directly compared with those of the other years. Comparability with the three-year training occupations is also restricted concerning the total value across all years of training.

Figure 3: Gross costs, returns and net costs per apprentice in the 2022/2023 training year by years of training in three-year occupations (in €)



n = 8,233

Source: BIBB-CBS 2022/2023

takes place outside the work process, e.g. in a training workshop. For this reason, apprentices are rather unlikely to be deployed for productive tasks. In the first year of training, for example, apprentices in three-and-a-half-year occupations worked on the creation of products and services for an average of around 20 days fewer than their counterparts in three-year occupations. The variance was still 15 days in the third year of training. This difference applied almost exclusively to skilled worker tasks. Apprentices in three-and-a-half-year occupations frequently need longer periods of learning outside the workplace in order to be prepared for productive deployment. In the final year of training, however, they reached the same high level of performance in exercising skilled tasks as apprentices in three-year training occupations.

► Substantial increase in gross costs and returns between 2017/2018 and 2022/2023 – net costs increased, too

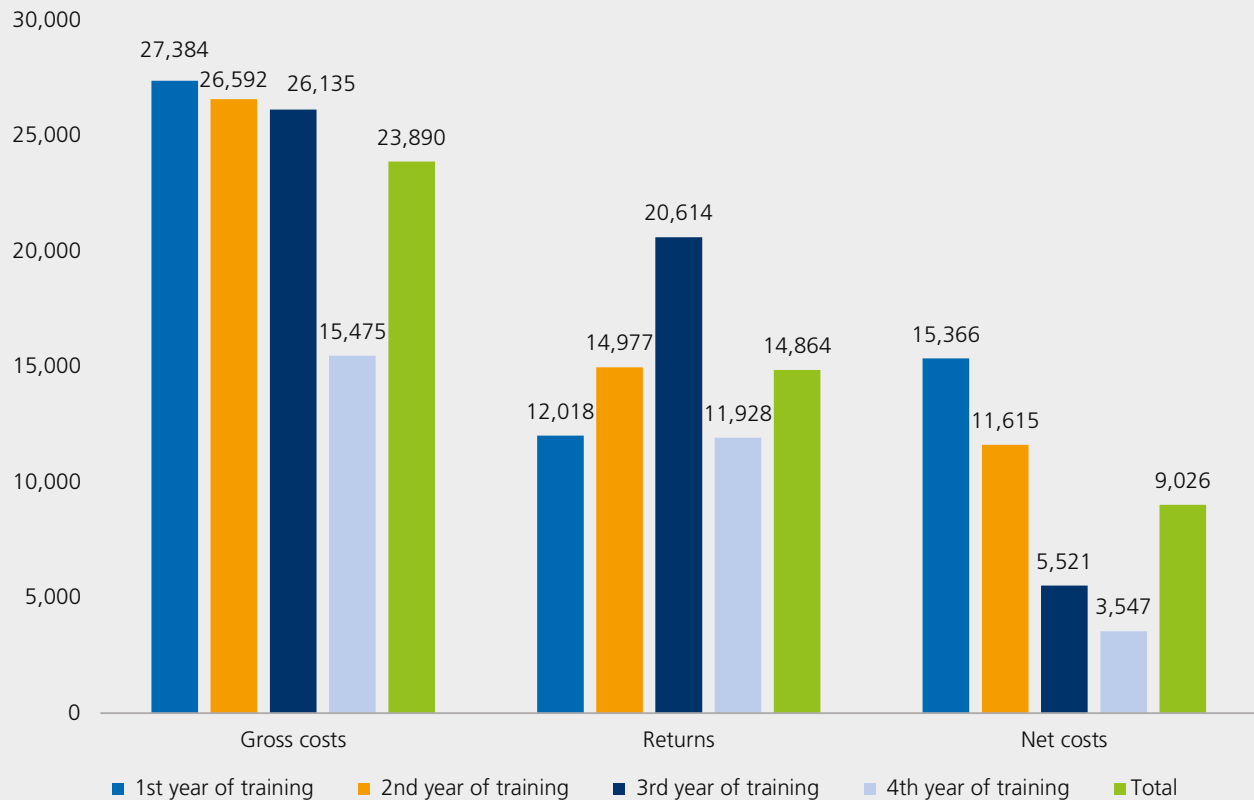
The survey for the 2022/2023 training year is already the seventh Cost-Benefit Survey conducted by the BIBB since 1980 (cf. PFEIFER/SCHÖNFELD/WENZELMANN 2021). The last four surveys since 2007 in particular enable analyses of the development of training costs and other important indicators, e.g. the retention rates of trainees after successful completion of training, as methodological and questionnaire adjustments were only made in such a way that comparability is not or only slightly restricted (for details, see the methodological explanations in the Information Box).

Firstly, we will present a descriptive consideration of the gross costs, returns and net costs from the surveys for

the year 2007 and for the 2012/2013, 2017/2018 and 2022/2023 training years.¹⁰ Regression analyses will then be conducted to control for developments in the operational structure of the firms providing training. Interaction terms will then be used to investigate the extent to which different developments took place, e.g. by training sectors or by firm size categories. Changes in recruitment costs, subjective assessments of the availability of skilled workers on the regional labour market, the retention rates of trainees in the firm after completing their training, and the firm's strategy for taking on trainees are also considered. These are crucial parameters for the benefits which firms are able to derive beyond the duration

¹⁰ The surveys consist of independent cross-sectional studies. For this reason, no panel analyses can be conducted.

Figure 4: Gross costs, returns and net costs per apprentice in the 2022/2023 training year by years of training in three-and-a-half-year occupations (in €)



Note: It should be noted that the fourth year of training only lasts for six months.

n = 2,453

Source: BIBB-CBS 2022/2023

of training and which are incorporated into their training decisions.

In order to better categorise the results, we will first take a brief look at changes in the structure of training firms and the economic framework conditions. The number of firms providing training declined by around 60,000 between 2007 and 2022 despite a rise in the overall number of firms in Germany. For this reason, the rate of firms providing training fell from 24.1 percent in 2007 to 18.9 percent in 2022. A lower decrease was recorded in eastern Germany than in western Germany over the entire period (-4.1 percentage points as opposed to -5.6 percentage points). The decrease in the number of

firms providing training is mainly driven by micro firms with fewer than ten employees (cf. MOHR 2024).

Germany's (adjusted) gross domestic product (GDP) rose by an average of 1.2 percent per year between 2007 and 2022. Above-average growth was recorded for the survey years of 2007 and 2017/2018. Growth for 2012/2013 and for 2022/2023 was below the average level (cf. STATISTISCHES BUNDESAMT 2025a). The coronavirus pandemic is likely to have had an impact on the current study. Third-year apprentices had, for example, commenced their training at the height of the pandemic and of the resulting economic crisis in 2020 (GDP: -4.5%). Various studies conducted

for Germany and Switzerland (cf. e.g. MUEHLEMAN/PFANN/PFEIFER 2024; LÜTHI/WOLTER 2020; BELLMANN/GERNER/LEBER 2014) were able to show that firm participation in training is also cyclically dependent. Expectations regarding economic development have, for example, proved to be a good predictor for the number of training places offered (cf. MUEHLEMAN/PFEIFER/WITTEK 2020). It should be noted that, due to its cross-sectional nature, CBS data does not permit any analyses in respect of the influence of economic development on costs and benefits. Nevertheless, this should be borne in mind when interpreting the results.

Methodological explanations on the comparison of the surveys

Firm datasets are used for the time comparisons. With regard to costs and returns, average values are in each case estimated across the entire duration of training. The respective values for training years in which a firm has no apprentices and hence no cost and benefits were measured are estimated using the information of the filled training years and the results of the other firms. Because of this approach, the average values for the 2022/2023 training year presented in Table 2 differ from the values calculated on the basis of the apprentices (cf. e.g. Table 1).

The approach for enquiring about costs and returns and calculation of the various cost values remained largely unchanged in the 2007, 2012/2013, 2017/2018 and 2022/2023 surveys.¹¹ There were, however, adjustments to the sampling. For the 2012/2013, 2017/2018 and 2022/2023 surveys, a random sample was drawn from all firms providing training in a training occupation pursuant to the Vocational Training Act or Crafts and Trades Regulation Code. Because costs and benefits always relate to a certain occupation, information was collected on 211 different occupations (2012/2013), 210 different occupations (2017/2018) and 187 different occupations (2022/2023), respectively.¹² 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). In 2007, 2,986 firms providing training were surveyed. The figures for 2012/2013, 2017/2018 and 2022/2023 were 3,032, 3,049 and 3,207, respectively. In addition to this, different interview methods were deployed in the current survey (cf. WENZELMANN/SCHÖNFELD 2025). As previously, some firms were questioned face-to-face at their premises. Telephone interviews were also conducted, and firms were able to complete the questionnaire online.

The Consumer Prices Index of the Federal Statistical Office is used in order to take account of the development of the general price level of goods and services between 2007 and 2022 (cf. STATISTISCHES BUNDESAMT 2025b). Correction factors of 1.30 are produced for the period from 2007 to 2022. The correction factors from 2012 to 2022 and from 2017 to 2022 are 1.20 and 1.14, respectively. The average values calculated from the surveys are multiplied by these figures.

Table 2 presents the results of the descriptive comparison of gross costs, returns and net costs for the four survey years. A relatively small and continuous increase took place in respect of the gross costs from 2007 (€20,741) to 2017/2018 (€23,527). In 2022/2023, however, there was a somewhat more significant rise to €27,074. In real terms, returns fell slightly by around €400 between 2007 and 2012/2013. The increase between 2017/2018 (€16,585) and 2022/2023 (€18,455) was also not as large as the rise in gross costs. Over the entire period, this re-

sulted in an average increase in net costs of about €3,000 to €8,619 in the 2022/2023 training year. Despite a decrease in the number of apprentices, this meant that overall macroeconomic investment in firm-based training rose to around €9.7 billion. Training allowances and wages, which nominally speaking increased more sharply than the general price level, are important drivers of the increase in gross costs and returns. Between 2007 and 2022, training allowances went up by about a quarter in real terms. Skilled worker wages increased by approximately seven percent during the same period. Disproportionately high rates of growth occurred in the craft trades, in agriculture and at micro firms.

Figures 5 and 6 provide a graphical presentation of the results of the OLS regressions¹³ for training sectors and firm size categories, depicted as linear predictions of net costs over the course of time.¹⁴ The explanatory variables included in the regressions in each case are survey years, firm size categories, western and eastern Germany, type of occupation (industrial, commercial, technical),¹⁵ and the deployment of a training workshop in training. Interaction terms of the variables presented are supplemented with the survey years in each case.

Figure 5 shows the linear predictions for the training sectors. Net costs in the public sector increased the most over the period from 2007 to 2022/2023. About three quarters of this increase occurred between the 2017/2018 and

¹³ Ordinary least squares.

¹⁴ The full results of the OLS regressions and the results of analogue regressions for gross costs and returns can be made available on request. The appendix also contains supplementary evaluations for eastern and western Germany.

¹⁵ Because the STEM category is not available for the 2007 and 2012/2013 surveys, the previous category of technical occupations is used instead. Most technical occupations are, however, also STEM occupations.

¹¹ Minor adjustments in the 2017/2018 survey with regard to distribution of training times to the individual years of training and the switch from the calendar year (2007) to the training year (2012/2013) exert only a slight influence on the average values calculated. In 2022/2023, skilled tasks were also evaluated using the wage costs of skilled workers in the selected occupation for the purpose of the calculation of returns. On average, these costs were slightly below the measurement previously used of those of an average skilled worker at the firm (irrespective of occupation). This did not, however, tend to lead to any change in the results, as is shown by an alternative calculation using the wage costs of an average skilled worker at the firm.

¹² Nevertheless, the low sample sizes in the majority of occupations mean that no individual evaluations are possible.

Table 2: Comparison of gross costs, returns and net costs per apprentice and year for 2007, 2012/2013, 2017/2018 and 2022/2023 (in € in prices of 2022)

Year	Gross costs	Returns	Net costs	n
2007	20,741 (9,622)	15,160 (6,818)	5,581 (11,299)	2,986
2012/2013	21,483 (9,006)	14,712 (5,799)	6,771 (10,427)	3,032
2017/2018	23,527 (8,966)	16,585 (6,004)	6,941 (10,441)	3,049
2022/2023	27,074 (9,387)	18,455 (6,250)	8,619 (10,585)	3,207

Note: weighted average value in the first row, standard deviation in brackets in the second row.

Source: BIBB-CBS 2007, 2012/2013, 2017/2018 and 2022/2023

the 2022/2023 surveys. Net costs rose by €6,300 (+62%) per apprentice and year during this period. A strong increase of almost €6,700 also took place in the liberal professions over the entire period. This represents more than a fourfold increase. However, the sharpest rise occurred during the first two surveys in this case. Increases in the largest training sectors of trade and industry (about €1,900, +26%) and the craft trades (€2,700, +52%) were, on the other hand, significantly lower over the 15 years. In the case of trade and industry, virtually the whole of the increase took place between the 2017/2018 and 2022/2023 surveys. A significant decline in net costs was recorded in agriculture between 2007 and 2012/2013. This was, however, offset in subsequent years. Nevertheless, this training sector exhibited the lowest net costs across all surveys.

As far as firm size categories were concerned, the micro firms displayed the highest overall increase in both percentage and real terms (77%, cf. Figure 6). This category of firm had the highest net costs in 2022/2023, around €9,400. In 2007, the micro firms had recorded the lowest average net costs together with firms with between 50

and 499 employees. A significant rise in net costs (+55%) was recorded for firms with between 10 and 49 employees, particularly during the period from 2017/2018 to 2022/2023. This was caused by a significant increase in gross costs accompanied by a much smaller rise in returns. Development was less constant amongst large firms. In overall terms, this group saw a decrease in net costs of eleven percent to about €7,500 per apprentice and year. The relatively low sample sizes in this group means that both the confidence intervals and therefore also the uncertainty of the evaluations are relatively large. Developments are thus mostly insignificant.

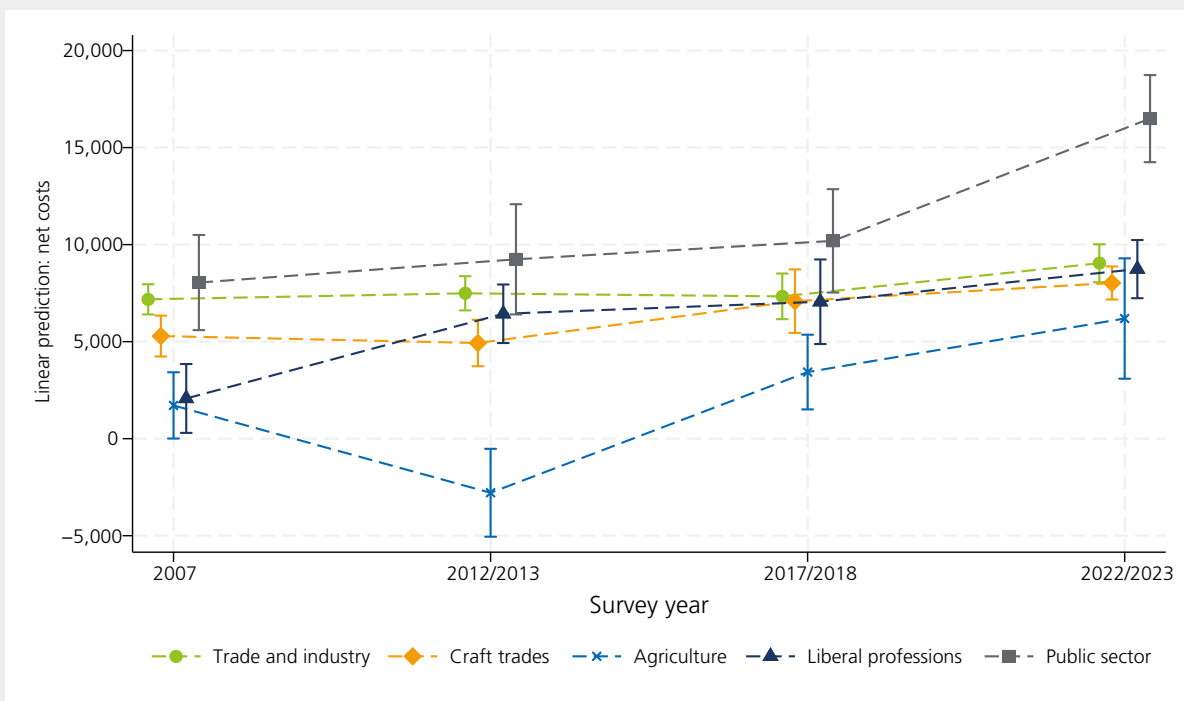
► Recruitment costs for skilled workers increased more sharply than net training costs

For the 2022/2023 training year, firms were able to cover an average of 69 percent of the gross costs of training via productive work of apprentices in the firm (cf. Figure 1). Assuming that firms act in an economically rational manner, there must be further beneficial elements of training for firms with net investments in addition to the produc-

tive tasks of apprentices. Otherwise, the training would not be worthwhile for them. Retaining former apprentices as skilled workers can be a considerable benefit. This pays off for firms for three reasons in particular. Firstly, external recruitment of skilled workers may be challenging because of the shortage of such qualified staff. Secondly, firms which provide training have an information advantage as they can observe the productivity of their apprentices during training. By way of contrast, the productivity of applicants on the external labour market cannot be easily assessed. A third relevant and beneficial element of the continued employment of apprentices is that firms save recruitment costs which would otherwise be incurred by searching for and possibly providing additional training and induction for workers that are recruited externally.

In order to obtain information on these recruitment costs, they were collected in the 2022/2023 BIBB-CBS for the most recently recruited skilled worker. This included not only the costs incurred prior to the conclusion of a contract (costs for the application procedure), but also those components arising thereafter. The costs which are of relevance after the signing of a contract particularly include continuing training costs and costs incurred as a result of the initial differences in productivity between the new skilled worker and an average skilled worker at the firm. The calculation of recruitment costs for skilled workers of firms in the CBS 2022/2023 is based on information supplied by 2,668 firms (2,147 providing training and 521 not offering training) which have recruited skilled workers from the labour market since 2020. In the case of firms providing training, recruitment costs relate to a skilled worker in the occupation for which training costs were recorded. For firms not offering training, the recruitment costs refer to the

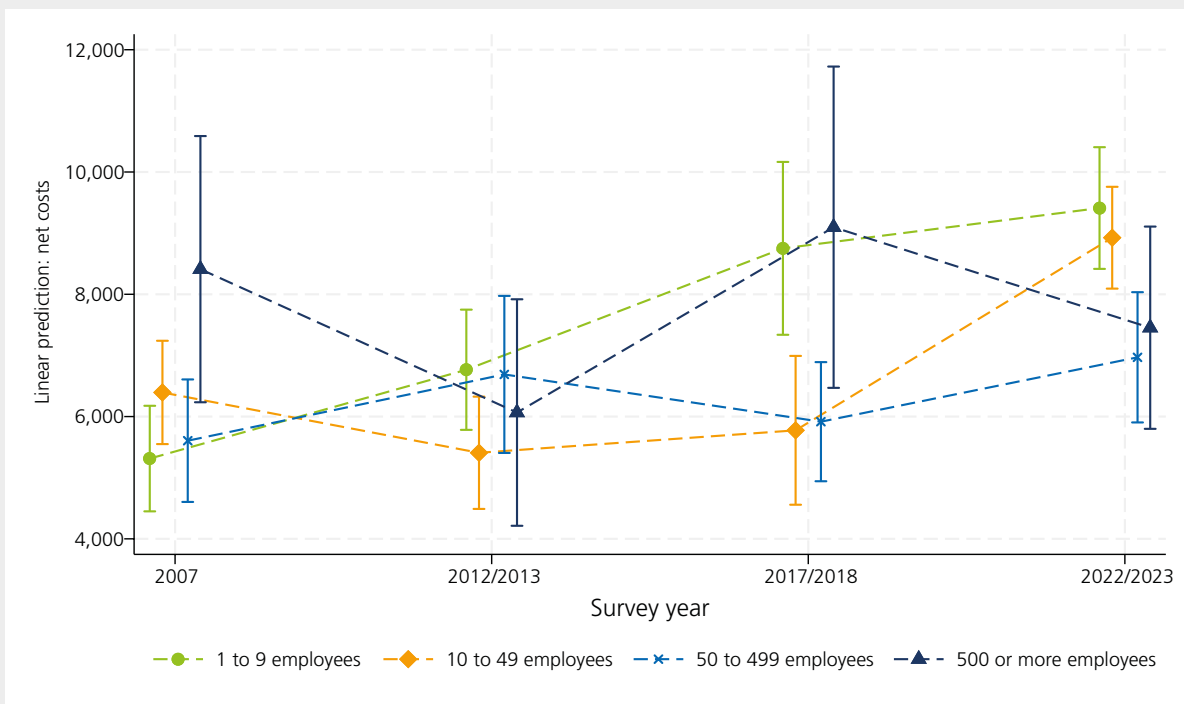
Figure 5: Comparison of the years 2007, 2012/2013, 2017/2018 and 2022/2023 – linear predictions of net costs by training sectors in € in prices of 2022



n = 12,247

Source: BIBB-CBS 2007, 2012/2013, 2017/2018 and 2022/2023

Figure 6: Comparison of the years 2007, 2012/2013, 2017/2018 and 2022/2023 – linear predictions of net costs by firm size categories in € in prices of 2022



n = 12,247

Source: BIBB-CBS 2007, 2012/2013, 2017/2018 and 2022/2023

training occupation exercised by the skilled worker most recently recruited.

Overall average recruitment costs were €13,689 per skilled worker (cf. Table 3). This corresponded to just below 59 percent of the average overall net costs of a three-year apprenticeship programme. However, recruitment costs per firm were not distributed symmetrically around the mean value; in 50 percent of firms, they were below €5,700. A look at the components of recruitment costs shows that continuing training costs accounted for an average of 56 percent of overall costs during induction and were therefore the largest cost element. Costs for continuing training encompass costs for continuing training courses (course fees, travel expenses and costs for overnight accommodation; €701), downtime costs in the workplace because of training participation (€494) and personnel costs arising because of informal training (€6,448).¹⁶

The second largest cost factor in external recruitment, accounting for 33 percent, is the cost of temporary reduced productivity of new employees during their induction. The average costs in this regard were €4,468. Costs for the application procedure (€1,577) accounted for about eleven percent and were the smallest cost element. Costs for the application procedure include advertising costs, personnel costs for the selection process and costs for external advisors.

As is the case with training costs, there were also differences in recruitment costs depending on various structural characteristics. However, these differences are relatively small across regions (cf. Figure A3 in the appendix). Recruit-

Table 3: Recruitment costs for a newly recruited skilled worker by types of cost (in €)

Type of cost	Total
Application procedure, of which:	1,577 (3,534)
Advertising costs	656 (1,513)
Personnel costs for the application process	507 (896)
Costs for external advisers	414 (2,090)
Continuing training costs during induction period, of which:	7,643 (11,585)
Costs for continuing training	701 (3,392)
Work downtime costs because of continuing training	494 (1,703)
Personnel costs through informal training	6,448 (9,615)
Costs as a result of lower performance during the induction period	4,468 (9,270)
Total recruitment costs	13,689 (20,027)
n	2,668
Note: weighted average value in the first row, standard deviation in brackets in the second row. Source: BIBB-CBS 2022/2023	

ment costs were slightly below average in northern and southern Germany. Employees in northern Germany tended to spend less time on informal training, resulting in lower personnel costs for informal training. Costs incurred as a result of lower performance of a newly recruited skilled worker during the induction period were slightly lower in southern Germany. However, costs for the application procedure, which made up 17 percent of the total, were relatively high. This was mainly due to greater expenditure on job advertisements and on external advisors.

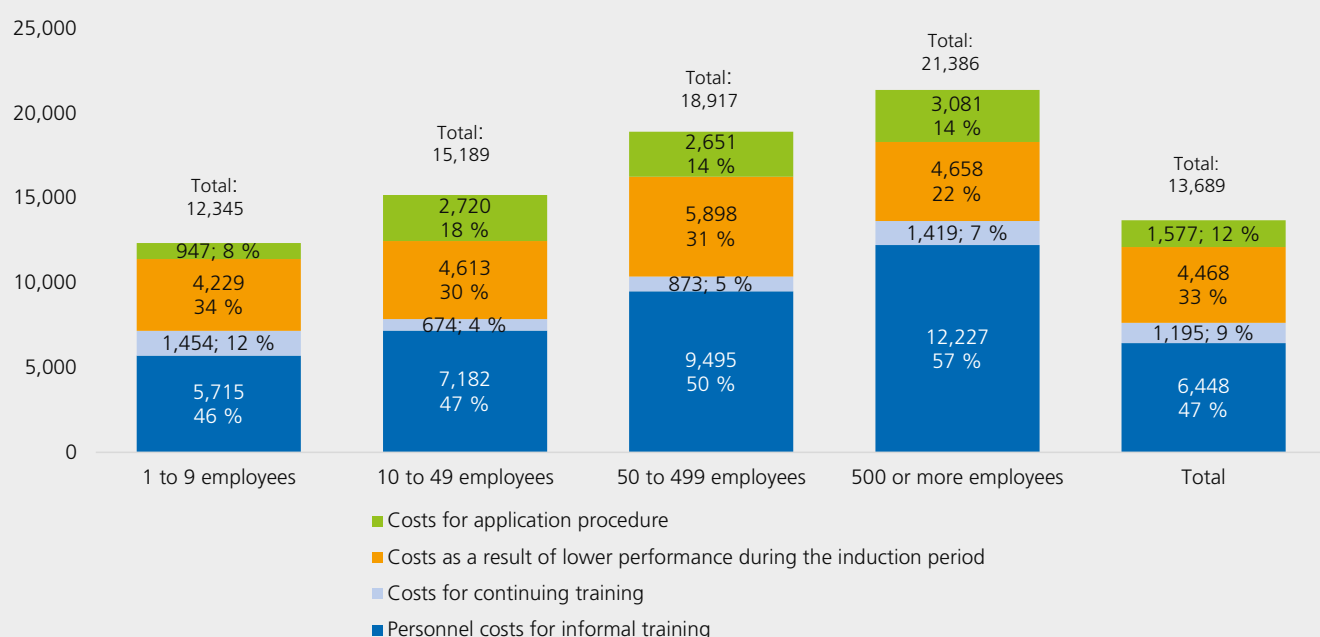
Recruitment costs show significantly greater variance across different firm size categories (cf. Figure 7). Overall costs rose in line with firm size. Total recruitment costs for a skilled worker in micro firms were €12,345. On aver-

age, this figure was just over 40 percent lower than that recorded for large firms with 500 or more employees (€21,386). It is striking that in large firms, personnel costs for informal training accounted for 57 percent of total recruitment costs, which is a significantly higher proportion than in smaller firms. The other side of the coin was that performance in the induction period was comparatively low in large firms. In micro firms, the costs for the application process were comparatively low at less than €1,000 (8%), while in firms with ten to 49 employees, these costs added up to €2,720 (18%).

In order to compare the costs for recruitment of skilled workers with the costs for apprenticeship training over time, Figure 8 contrasts the growth rates of recruitment costs and net train-

¹⁶ Terminologies were adjusted and sub-costs of recruitment were regrouped vis-à-vis the 2017/2018 CBS. However, the overall total of recruitment costs contains the identical sub-costs and is thus comparable.

Figure 7: Recruitment costs for a newly recruited skilled worker by firm size categories (in €, proportions in %)



Note: In order to highlight the high proportion of personnel costs incurred as a result of informal training, these costs are stated separately from the other continuing training costs.
n = 2,668

Source: BIBB-CBS 2022/2023

ing costs, normalised to 2012/2013.¹⁷ The costs are a linear prediction and, as above, are determined in an OLS regression. The explanatory variables used are the survey year and its interaction with the firm size category and western and eastern Germany. The total percentage increase in recruitment costs since 2012/2013 was 65 percent. This was significantly higher than the rise in net training costs (28%). For firms that (also) train as a long-term human capital investment, training has thus become even more attractive than external recruitment over time from a cost perspective. The results presented in this section allow the conclusion that the savings in recruitment costs at least partially offset the training costs

as long as the firm retains apprentices it has trained itself into permanent employment.

► Situation on the regional skilled worker market remains strained

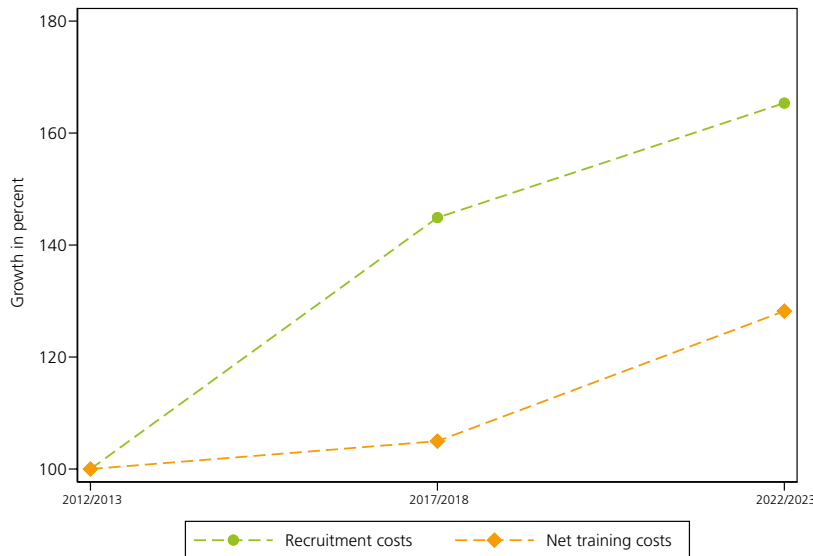
Retaining apprentices permanently as skilled workers upon completion of training is an important part of the benefit which firms are able to generate from training. Reference has already been made above to the constricted nature of the skilled worker market. The supply-demand situation on the labour market varies by region, occupation or sector (cf. e.g. MAIER et al. 2024; BOSSLER/POPP 2023). In the 2007, 2012/2013, 2017/2018 and 2022/2023 surveys, the firms' evaluation of the regional availability of suitable skilled workers in a certain training

occupation¹⁸ at the time of the survey in each case was identified on a scale from 1 (very good) to 5 (very poor). Seven in ten firms in the 2022/2023 survey rated the skilled workers situation as poor (28%, scale value 4) or as very poor (42%, scale value 5). The overall average was a mean value of 4.0 (cf. Figure A4 in the appendix). The situation on the labour market relevant to the firms deteriorated significantly from an average of 3.1 in 2007 to 4.1 in the 2017/2018 survey year. Similar values were measured five years later. It is therefore likely that many firms have been confronted with difficulties in filling skilled worker positions for a longer period of time. A significant worsening of the situation was revealed for smaller firms in particular. In 2007, when values were between 3.0 and 3.1,

17 In the 2017/2018 and 2022/2023 surveys, recruitment costs were collected for the most recently recruited skilled worker in the relevant occupation. In the 2012/2013 BIBB-CBS, costs related to an average of all skilled workers recruited. Induction costs were only partially recorded in the 2007 survey. For this reason, this survey was not included in the comparison.

18 This was the occupation for which the recruitment costs were identified. In 2007, on the other hand, information for firms not providing training related to an occupation in which they would most likely offer training.

Figure 8: Growth rates of recruitment costs and net training costs in percent for the years 2012/2013, 2017/2018 and 2022/2023



n = 7,843 (net training costs), n = 9,288 (staff recruitment costs)
Source: BIBB-CBS 2012/2013, 2017/2018 and 2022/2023

differences by size categories had virtually disappeared. However, the gap had widened by 2017/2018, and there was no change in 2022/2023. Since 2017/2018, values around 4.0 have been recorded for micro firms and for small firms. They thus take a more precarious view of the skilled worker situation than medium-sized (3.7) and large firms (3.4).

The situation on the external labour market is closely related to vacancy periods at the firms. If there are insufficient suitable skilled workers on the labour market, then firms are unable to fill vacancies, or recruitment will be delayed. This may lead to costs or loss of revenues because orders cannot be executed either at all or to the desired scope. These costs are not incurred if firms are able to retain apprentices into permanent employment upon completion of training. In the BIBB surveys, this vacancy period is defined as the time between the announced

and actual recruitment date of the skilled worker.¹⁹ A sharp increase was displayed over the years, especially between 2012/2013 and 2017/2018. In 2007 and 2012/2013, skilled worker jobs remained vacant for one month on average. By 2017/2018, however, this period had extended to around four months (cf. SCHÖNFELD et al. 2020). A vacancy period of a similar length was also measured for 2022/2023. In 2007 and 2012/2013, a new skilled worker was able to commence work at the preferred time at just over half of the firms. This only continued to apply to about one firm in five by 2017/2018 and 2022/2023. Smaller firms were once again affected by particularly long search periods. In 2022/2023, micro

19 The nature of enquiry changed between surveys. In 2007, 2012/2013 and 2017/2018, firms estimated the average vacancy period on the basis of their experiences over the previous three years. In 2022/2023, they assessed the vacancy period for the skilled worker most recently recruited via the labour market. Although these values are thus not directly comparable, they can still be used to illustrate the development.

firms estimated the vacancy period at around 19 weeks. The corresponding figure for large firms was approximately ten weeks, a significantly shorter time. In overall terms, the results relating to the labour market situation and the time needed to fill job vacancies highlight that the acquisition of new skilled workers has been associated with difficulties for many years and that no improvement was apparent in 2022/2023 either.²⁰

► Shortages on the training market are making the recruitment of apprentices more difficult

In addition to the existing shortages on the labour market, there are also multifarious recruitment problems on the training market. These affect both young people who are unable to find a training place and firms which cannot fill the training places they have offered (cf. e.g. WELLER et al. 2024). The proportion of unfilled training places has increased sharply over recent years, from a vacancy rate of 15 percent in 2010 to 35 percent in 2023 (cf. e.g. FITZENBERGER/LEBER/SCHWENGLER 2024). Data relating to the availability of suitable apprentices on the regional training market was collected for the first time in the CBS 2022/2023. A scale from 1 “very good” to 5 “very poor” was used in the same way as the question relating to skilled workers. The average value across all firms providing training and not offering training was 3.6. The

20 The IAB Job Vacancy Survey also reveals a rise in the vacancy duration since 2010 (cf. GÜRTZGEN/KUBIS/POPP 2024). In the BIBB Establishment Panel on Training and Competence Development, the proportion of vacant positions rose from 17 percent in 2016 to 28 percent in 2021. The highest proportion of vacancies (34%) was for employees performing qualified skilled tasks, i.e. jobs for which workers who have completed vocational education and training or who have relevant occupational experience are generally sought (cf. WEIS 2023).

assessment was thus somewhat more positive than in the case of skilled workers, where the corresponding value was 4.0 (cf. Figure A4 in the appendix). A quarter of firms categorised the training market situation as very poor (42% in the case of skilled workers) and 27 percent saw it as poor (28% with regard to skilled workers). About one tenth of firms viewed regional availability of apprentices and of skilled workers as very good or good. Large firms viewed the training market as for skilled workers in a somewhat more positive light (value of 3.2) than smaller firms with fewer than 500 employees. The evaluations of the latter differed only slightly (3.6 and 3.7, respectively). 23 percent of firms providing training were unable to fill all training places offered in the 2022/2023 training year. These figures highlight the problems which many firms experience even in the lead-up to planning training and which may also result in involuntary withdrawal from training. Various analyses, including with the use of the IAB Establishment Panel, show that many firms cling to the notion of covering their skilled worker requirements via their own training by making training places available but are increasingly facing recruitment difficulties. Small firms and craft trade firms are particularly affected (cf. e.g. LEBER/SCHWENGLER 2025).

► High retention interest among firms

The problematic training market situation for some of the firms leads to the question of what strategy the firms providing training pursue when retaining their training graduates and how successful they ultimately are in doing so. The vast majority of firms providing training did so with the intention of retaining all or at least some of their apprentices (cf. Figure 9). Over the course of the survey years, there was

a sharp increase in the proportion of firms wishing to retain all apprentices after the end of training wherever possible. About half of the firms were in agreement with this strategy in 2007 and 2012/2013. By 2022/2023, almost three quarters were pursuing this goal. In addition to this, 22 percent of firms wished to retain at least some apprentices. This meant that only a small minority of around five percent of firms had no interest in retaining apprentices upon completion of training. This view was expressed by just under a quarter of firms in 2007. The wish to retain all apprentices after the end of training wherever possible increased both in overall average terms and within the firm size categories. Nevertheless, some differences are discernible. The smallest proportion expressing this wish, 66 percent, was measured at micro firms. 90 percent of large firms aimed to retain all apprentices after the end of training, the largest share in any size category. One of the reasons for these differences could be the lower (replacement) need for skilled workers at smaller firms. Another possible cause is the higher risk of failure to retain workers. Smaller firms factor this into their training strategy and planning from the outset and do not (or cannot) assume that they will retain apprentices at the end of training.

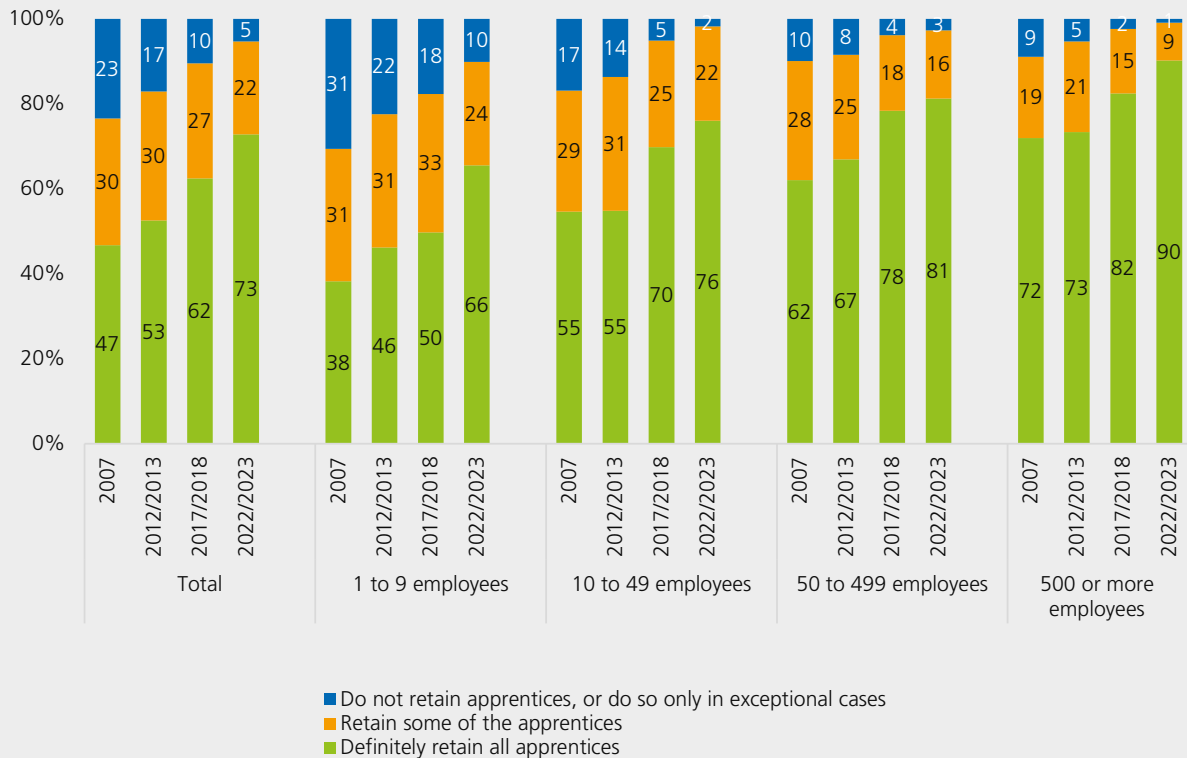
Even though most firms providing training wish to retain their apprentices after completion of training, taking them into permanent employment is not always possible. Firstly, those completing training also need to be interested in continued collaboration. Competing offers from other firms or different career plans such as commencement of a course of higher education study may, for example, stand in the way of continued employment. Changes to the general prevailing conditions at the firm may also prevent apprentices from staying after completion of training. One con-

ceivable possibility here would be a lower skilled worker requirement at the firm because of a deterioration in the economic situation. It may also emerge over the course of training that apprentices do not meet firm requirements.

Evaluations of the destination of trained skilled workers after one, three or five years (cf. Figure 10) illustrate how well firms succeed in retaining their apprentices upon completion of training. The proportion of persons completing training who were still employed at the firm one year after the end of training increased from 53 percent in 2007 to 56 percent in 2012/2013 and further to 64 percent in the 2017/2018 survey. This corresponds with the high degree of interest of firms in taking on apprentices permanently upon completion of training. However, no further increase was achieved in subsequent years. Instead, the figure consolidated at 62 percent in 2022/2023. This indicates that firms are arriving at a limit and are not able to retain a larger proportion of their former apprentices.²¹ Similar developments were revealed in respect of firm size categories, although there were considerable variances in the proportions. In 2022/2023, only around half of the persons completing training at a micro firm remained at the firm for at least one year after completing training. The corresponding figure at large firms was over 80 percent. The retention rates have been decreasing over the years because of employees who leave the firm. This affects all firm size classes, although larger firms are more likely to achieve medium-term or long-term retention. In 2022/2023, one quarter of persons completing

²¹ LEBER/ROTH/SCHWENGLER (2023) also arrive at similar results by using the data of the IAB Establishment Panel. In this case, the number of apprentices taken on permanently at the end of training as a proportion of all persons completing training rose from 61 percent in 2010 to 77 percent in 2019. The rate has remained at this level ever since, albeit with slight fluctuations.

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



n = 2,964 (BIBB-CBS 2007), n = 3,020 (BIBB-CBS 2012/2013), n = 3,041 (BIBB-CBS 2017/2018), n = 3,186 (BIBB-CBS 2022/2023)
Source: BIBB-CBS 2007, 2012/2013, 2017/2018 and 2022/2023

training were still at the firm that had provided their training five years later. The corresponding proportion for firms with 50 employees and more was, however, more than half. In overall terms, the data shows that a considerable proportion of firms providing training can meet at least some of their skilled worker requirement via the training delivered and can thus derive benefits beyond the training itself.

► Conclusion: High level of willingness to invest by firms providing training

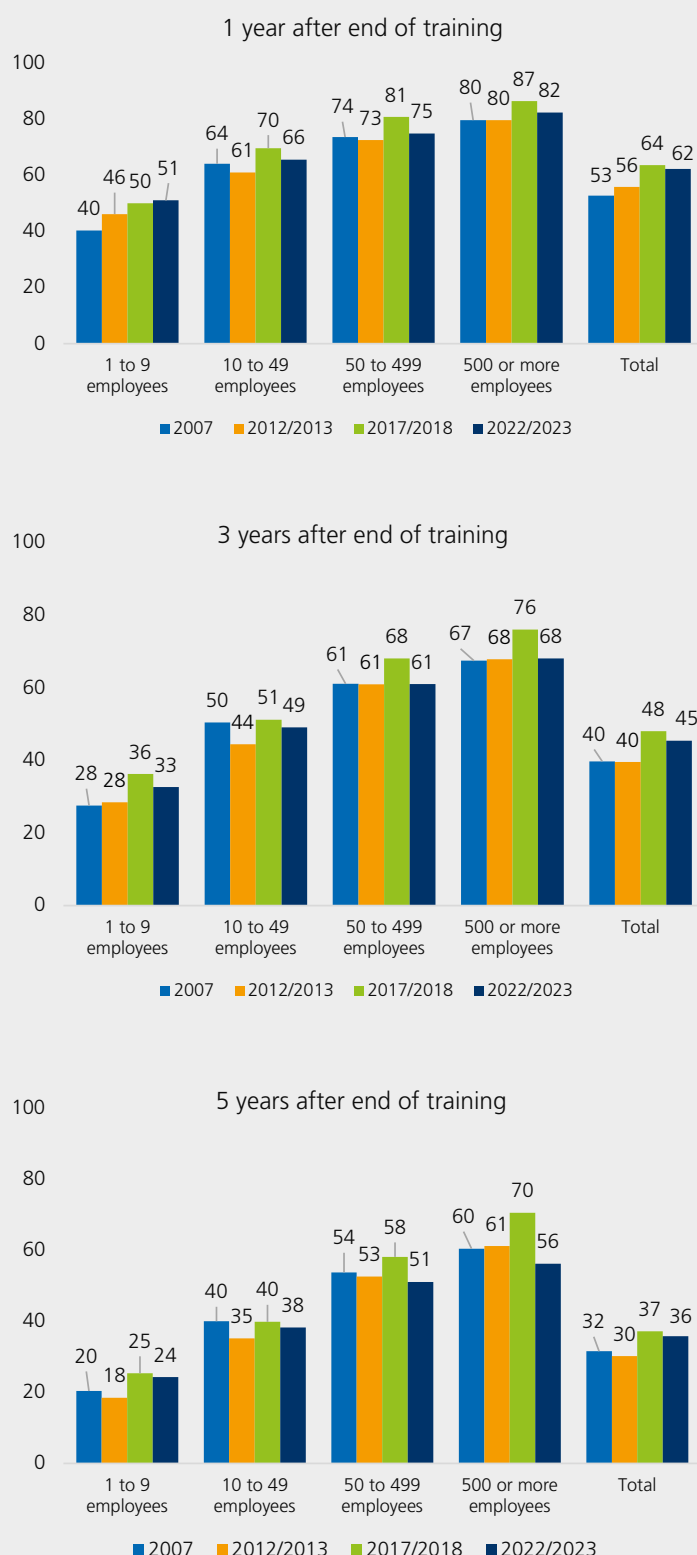
The results of the current CBS show a high degree of willingness on the part of firms to invest in their own training. Extrapolated to all training contracts, firm investments in the 2022/2023

training year amounted to around €9.7 billion. This was about €1.3 billion more than in 2017/2018 despite a decrease in the number of apprentices. In the 2022/2023 training year, less than ten percent of firms providing training were dissatisfied with the ratio between the costs and benefits of training. This indicates that beneficial factors extending beyond returns were able to compensate for the rise in net costs. More than three quarters of firms stated that “training qualified skilled workers with the aim of deploying them at the firm on a long-term basis” was a very important reason for providing training. A further 13 percent saw this as an important reason. 43 percent also thought that the saving of recruitment and induction costs when acquiring skilled workers was an important or a very important reason for providing their own training. Almost all firms providing training

(95%) wanted to employ at least some of their apprentices as skilled workers. 43 percent of firms not offering training agreed with the statement that they did not provide training because there was “no foreseeable requirement for relevant skilled workers”. Skilled worker acquisition was thus the key motive for or against the recruitment of apprentices in Germany.

The analyses of costs for skilled worker recruitment via the external market also confirm that investments in apprentices pay off. These costs have risen more sharply than the net costs of training. This correlates with the finding that firms invest more in external skilled worker recruitment when skilled worker shortages become worse (cf. LINCKH/MUEHLEMAN/PFEIFER 2024 for Germany; MUEHLEMAN/STRUPLER LEISER 2018 for Switzerland). The ben-

Figure 10: Average 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 (BIBB-CBS 2007), n = 2,690–2,857 (BIBB-CBS 2012/2013), n = 2,586–2,716 (BIBB-CBS 2017/2018), n = 2,471–2,682 (BIBB-CBS 2022/2023) – different sample sizes depending on duration of retention because firms which have not been providing training for long or which did not take any apprentices into permanent employment were not surveyed (further).

Source: BIBB-CBS 2007, 2012/2013, 2017/2018 and 2022/2023

efit which the firms were able to derive from subsequently employing apprentices thus increased disproportionately. The degree of interest in taking on apprentices permanently upon completion of training was accordingly very high.

Prognoses assume that the requirement for qualified skilled workers will decrease by 2040. However, the number of persons who have completed training at the skilled worker level will decrease by twice as much (cf. MAIER et al. 2024). In this regard, it will remain of central importance in the future to provide firms with the necessary conditions to offer high-quality and cost-effective training. Particular attention must be given to ensuring that firms are not overstretched financially. The significant decline in training participation by micro firms is a cautionary example. In addition to the aspect of the general availability of suitable apprentices, the fact that net costs have risen by 77 percent at these firms since 2007 could have led to a situation in which training is no longer financially worthwhile for many. Securing a supply of skilled workers is likely to be associated with especially major problems for these firms in particular.

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► Appendix

► Comparison of net costs development between western and eastern Germany – linear predictions

The trend in net costs, controlling for other operational characteristics, was largely identical in western and eastern Germany from 2012/2013 on. In 2007, net costs in the East were still significantly lower than in the West (see Fig. A1). Over the entire period, they increased by 51 percent in western Germany, while the increase in eastern Germany was steeper at 91 percent. From the 2017/2018 survey to the 2022/2023 survey, the increases were 22 percent in the West and 30 percent in the East. For the first three waves, the estimated expected gross costs and returns in eastern Germany were significantly lower than the figures in western Germany. By 2022/2023, the difference was only slight and no longer significant. This was due to convergence in training allowances and wages.

Figure A1: Comparison of the years 2007, 2012/2013, 2017/2018, and 2022/2023 – linear predictions of net costs between western and eastern Germany in € in prices of 2022

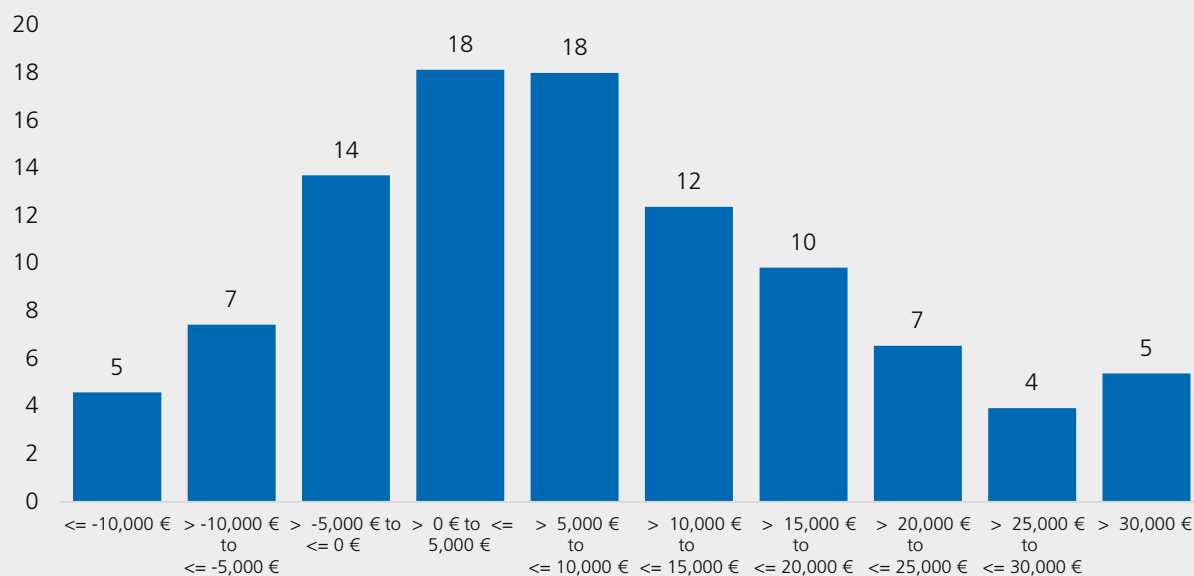


n = 12,274

Source: BIBB-CBS 2007, 2012/2013, 2017/2018, 2022/2023

► Supplementary Figures

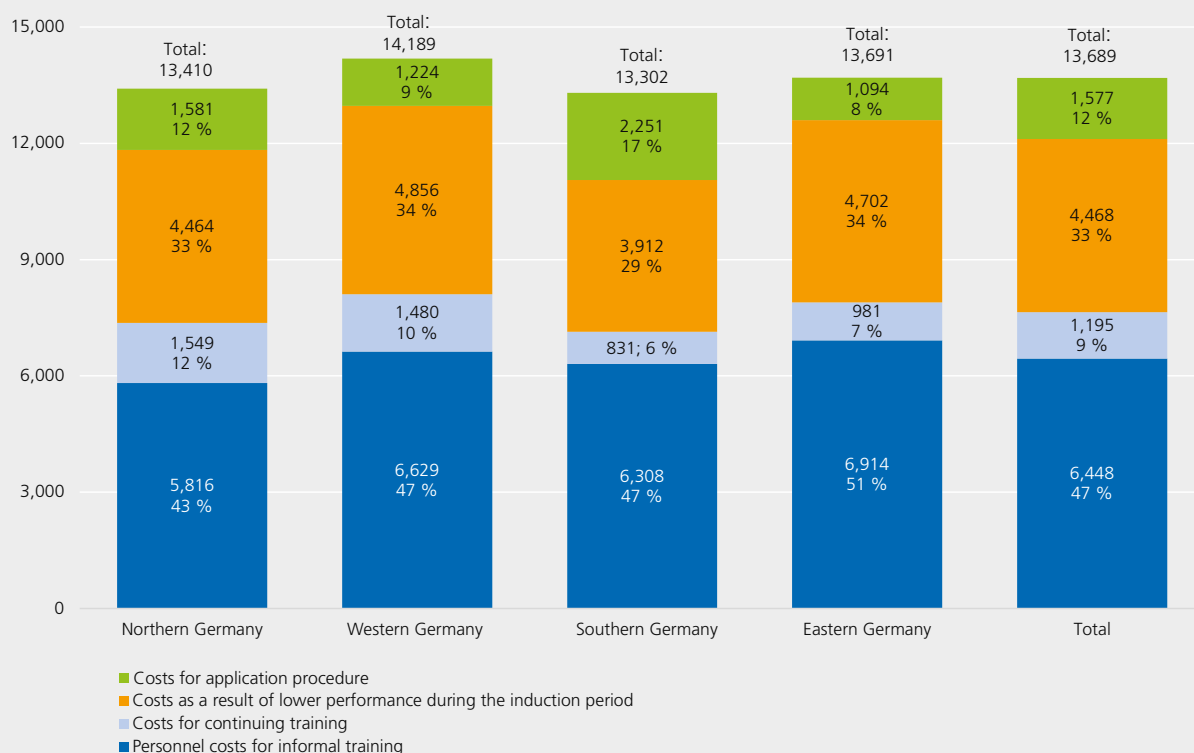
Figure A2: Distribution of net costs in the 2022/2023 training year (percentage of apprentices in each class)



n = 10,797

Source: BIBB-CBS 2022/2023

Figure A3: Recruitment costs for a newly recruited skilled worker by region (in €; proportions in %)

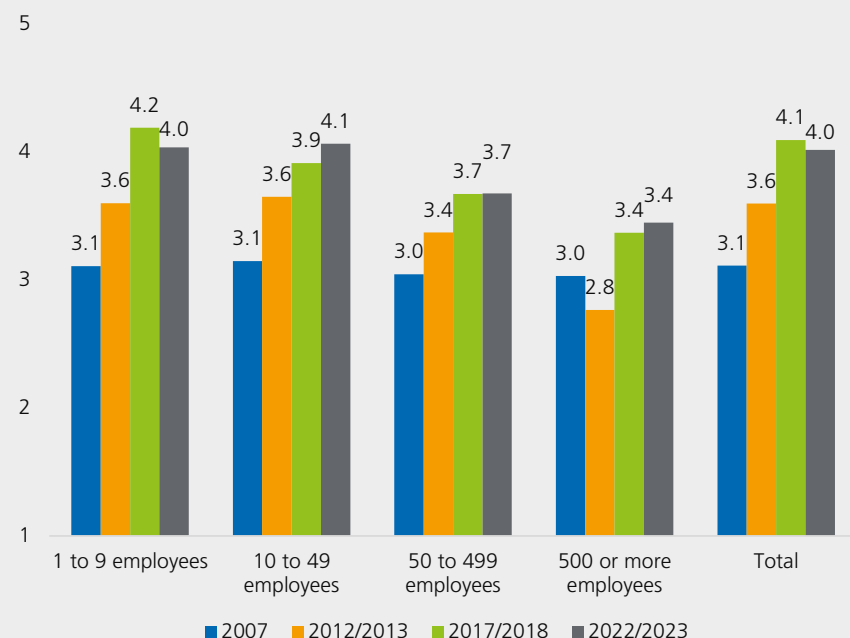


n = 2,668

Note: In order to highlight the high proportion of personnel costs incurred as a result of informal training, these costs are stated separately from the other continuing training costs.

Source: BIBB-CBS 2022/2023

Figure A4: Firms' assessments of the availability of suitable skilled workers in the regional labour market, by survey years and firm size categories (mean values; scale from 1 = very good to 5 = very poor)



n = 3,360 (BIBB-CBS 2007), n = 3,681 (BIBB-CBS 2012/2013), n = 3,813 (BIBB-CBS 2017/2018), n = 3,874 (BIBB-CBS 2022/2023)

Source: BIBB-CBS 2007, 2012/2013, 2017/2018, 2022/2023

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