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The cost of training apprentices

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ISBN 978 1 921412 96 7 web edition

TD/TNC 95.27

Published by NCVER
ABN 87 007 967 311

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About the research

The cost of training apprentices

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Apprenticeships are the time-honoured model for training tradespeople. While there has been some increase in trade apprentices in recent years, there have been parallel concerns that this may not be sufficient to offset current skills shortages, as well as build sufficient stock for future demand. In this context, the report examines the costs that both employers and apprentices incur for undertaking training in the plumbing and electrical industries.

The importance of understanding costs is fundamental. Employers will not take on apprentices if the cost is too high, and prospective apprentices will not undertake an apprenticeship if the future benefits (increased wages) do not outweigh the immediate costs to them (mostly the opportunity cost of alternative jobs).

This report is based on data from six case studies of actual electrical and plumbing apprentices. Although the number of case studies is small, the clarity of the results suggests that they have real salience.

Key messages

- The apprenticeship model involves a substantial financial commitment from employers. The numbers currently involved in training apprentices attests to apprentices' value to employers.
- The highest costs to employers are for supervision, as apprentice wages are more or less equal to their productivity.
- The effect of government incentives on employers' decisions to train apprentices is minimal, as they do not represent a significant discount to employers.
- Apprentices also incur costs, based on the loss of potential wages (opportunity cost). The opportunity cost is very sensitive to the alternative wage available to the apprentice.
- Apprenticeships are more attractive to young people (because of lower opportunity costs) and will be unattractive to older people, unless the premium paid to qualified tradespeople is substantial.

The authors argue that the high cost of apprenticeships will constrain the numbers of employers willing to take on apprentices, especially in a downturn. Therefore, it is worth considering a model which reduces the cost to employers by making more use of institution-based training, so that apprentices require less supervision and are more productive in the workplace. Such a model may not reduce costs overall but would transfer costs from employers to governments and prospective apprentices.

Tom Karmel
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Contents

Tables and figures

Tables

Figures

Introduction

The apprenticeship system is the mainstay of training for the trades in Australia. It is based on a legal contract (the contract of training) between an individual (the apprentice), an employer and a training provider. From a training point of view there are two important ingredients: on-the-job training and experience; and off-the-job formal training. It is the on-the-job training and work experience that makes the apprenticeship form of training quite different from institution-based training.

Apprenticeships, as a form of training, have many advocates. However, they do have one particular drawback: apprenticeships require an employer willing to take on an apprentice. It is also true that the model requires individuals willing and able to become apprentices, but this is not unique to the apprenticeship model—institution-based training models also require willing and able students.

Recent skill shortages have put the spotlight on the numbers of apprentices in the trades. While the number of traditional trade apprentices has gone up in recent years (NCVER 2008), there remains a concern that the numbers being trained are inadequate for future needs. The issue needs to be approached from two fronts. The first is whether there are sufficient young people who wish to become apprentices (some commentators have focused on what they see as an unnecessary concentration on university studies), while the second is whether there are sufficient numbers of employers willing to take on apprentices. In both cases, individuals or employers will weigh up the costs and measure them against the benefits. It is the costs and benefits that are the subject of this project.

We have to be careful here, and be mindful of the debate between Dockery et al. (2001) and Chapman and Cully (2002). The former found the costs of 'new apprenticeships' to be very high—on average, $38 000 for four years. Chapman and Cully were critical of the accuracy of the costs and benefits, but also made the point that, if the costs were as high as those reported by Dockery and his colleagues, then employers would simply not train apprentices in the numbers that they do. The very fact that we observe large numbers of apprentices implies that, for many employers and individuals, the benefits outweigh the costs, on the assumption that individuals and employers are rational and not ill informed. Of course in the cases where the costs outweigh the benefits, then the apprenticeship would not go ahead. In this sense we only observe part of the picture of 'costs and benefits of apprentices'—that part where benefits exceed costs.

The point of this project is to set up a framework for understanding costs and benefits of apprenticeships and to populate the framework with some data from actual apprenticeships. While we cannot claim this gives a totally reliable picture (because of the censored nature of the data), we can use the resulting information to make inferences on the effectiveness of policy levers in encouraging either individuals to take up an apprenticeship or employers to take on an apprentice. For example, we can look at the likely efficacy of incentives and the role of apprentice wages.

The data used for the project come from six case studies[1], in collaboration with the Plumbing Industry Association, the National Electrical and Communications Association and Group Training

[1] The industries participating in the research project were chosen because of the similarities in relation to training time and industry licensing requirements. This enables comparison costs across industries to be made relatively simply. In all, six companies are included in the case studies: three in the electrical sector, one in refrigeration and two in plumbing.

Australia Ltd. The case studies focused on particular individuals undertaking a certificate III-level qualification in either electrical or plumbing. While the small number of case studies limits the ability to generalise the results, they amply illuminate the various factors that contribute to the cost of training an apprentice.

In the first section we construct the framework for assessing the costs and benefits. Essentially, we construct separate accounting frameworks for employers and individuals. The framework for employers covers wages and training, supervision costs, administration costs, and materials wastage on the cost side of the ledger; and incentives, productive work and other benefits on the benefit side of the ledger. The framework for individuals covers tuition fees, costs of tools and the opportunity cost of undertaking an apprenticeship. In each case we have a balancing item—the difference between the explicit costs and benefits—which we interpret as a lower bound of the implicit benefits. This is to account for the assumption that apprenticeships only occur when benefits exceed the costs. We acknowledge that it is possible that some of the net benefits from the employer's point of view may not be tangible; for example, where an employer wants to 'give back to industry' and sees the provision of apprenticeships as a contribution to the industry. Another example is an employer who stated they 'were able to train apprentices to their company requirements', acknowledging the benefits to them of training apprentices. Similarly, the implicit benefits to an apprentice are not directly observed, but will depend on the premium attached to becoming a qualified tradesperson.

Section two fills in the accounting framework. Here the predominant issues to emerge are: the pattern of costs over the four years of an apprenticeship; the way that productivity increases over the four years and its relationship to wages; the sensitivity of opportunity-cost calculations to assumptions on the counterfactual to undertaking an apprenticeship; and the sensitivity of future benefits to an apprentice to the wage premium associated with becoming a qualified tradesperson.

In section three we discuss our findings, with a particular focus on the differences between the two ways of employing an apprentice—direct hire or hosting an apprentice through a group training organisation. Both these models allow employers to accommodate apprentice training within their business requirements and they appeal to the employers in our study for different reasons. With the structure of costs in mind, consideration of a hypothetical model of apprenticeship training is discussed. This model comprises two years of institution-based training before a period of on-the-job training. The point of such a model would be to increase the numbers of employers willing to take on an apprentice. Finally, we make a number of observations on the role of government incentives.

We end with some conclusions:

- The main cost of the apprenticeship lies in the costs associated with supervision, with the government incentive payments offsetting these costs only to a minor degree.
- The main cost to apprentices is the opportunity cost and this is balanced against the future premium that a qualified tradesperson receives relative to an unskilled worker. An apprenticeship is an attractive investment for a young person, but less so for older people, particularly in occupations where the skill premium is relatively small.
- The cost structures differ between direct-hire apprentices and those hosted through a group training organisation. Both models have advantages and appeal to different employers.
- The cost of the apprenticeship model to employers could be reduced if there were a change in the balance between skills learned in an institutional setting and experience in the workplace. However, such a change would increase the costs to individuals and the government.

Framework for assessing the costs and benefits of training apprentices

This section sets out, in an accounting framework, the costs and benefits of training apprentices. Table 1 relates to employers; table 2 relates to apprentices. Both tables give a brief description of the data required or excluded from each item. For more details see appendix 3, which contains the employer data collection and apprentice data collection sheets.

Table 1 Employer costs and benefits for training apprentices

Employer costs	Employer benefits
Direct costs *Apprentice wages*: includes any wages, superannuation, worker's compensation and payroll tax associated with the selected apprentice for each year. Allowances include any required payments made to the apprentice over and above gross wages, as set out in relevant legislation, industry award or workplace agreement. Voluntary allowances include any payments above minimum award wage specified in relevant legislation, industry award or workplace agreement. Other costs are any other costs directly associated with employing the apprentice. *Training fees*: includes any training fees related to the apprentice paid by the employer to an external training provider or cost of any internal training provided to the apprentice and paid for by the employer. *Group training fee*: cost of fees paid by employers to a group training company. *Indirect costs* *Apprentice supervision costs*: percentage of fully qualified worker's time spent supervising the apprentice (where more than one apprentice is supervised, only includes percentage related to this apprentice). *Administration costs*: annual time and cost spent on administration of the apprentice (e.g. time spent developing training plans, scheduling work and organising off-the-job training etc.). *Extra maintenance and materials wastage*: an estimate of the additional cost of wastage and maintenance and repair attributable to the apprentice.	*Government incentives*: Commonwealth or state government funding, incentives, and assistance received or due to the employer in relation to the apprentice. This may include assistance with costs of formal training; worker's compensation and/or payroll tax exemptions; wage subsidies; other financial incentives (such as disability incentives); and commencement, progression and completion payments. *Other incentives*: includes any other incentives paid to the employer from other organisations including industry organisations. *Productive contribution of apprentice*: apprentice's output measured in dollars. *Implicit benefit*: the additional benefit required to ensure that benefits exceed costs.

Table 2 Apprentice costs and benefits for undertaking training

Apprentice costs	Apprentice benefits
Training costs: any apprentice costs for off-the-job training.	*Incentives paid to apprentice*: any incentives paid to apprentice from government or other organisation.[1]
Costs associated with training: any costs such as tools, textbooks, safety equipment not paid for by the employer or group training company.	*Allowances/tax rebates*: tax rebates or allowances paid or due to apprentice.
Travel costs: travel costs incurred by apprentice for travel to and from training.	*Implicit value of future benefits*: the additional benefit needed to ensure benefits outweigh costs.
Opportunity cost: expected wages in an unskilled alternative job less actual wages.	

Note: 1 All apprentices would be eligible for the Tools for Your Trade incentive payment from the government. This incentive payment is available after nine months of continuous training with the employer in the first year.

Calculation of data items

Most of the data come directly from the data sheets, as shown in appendix 2. Four items have been derived: the productive contribution of the apprentice; the implicit benefit to the employer; the opportunity cost for the apprentice; and the implicit value of future benefits.

Productive contribution of apprentice

Apprentice productivity was calculated by asking both employers and apprentices for their perceived productivity, as a percentage, compared with that of a fully qualified worker. This was converted to a dollar figure using the average for the wages of a fully qualified worker supplied by employers in the case studies. Because of variation in wages, this was calculated separately for electricians and plumbers.

Implicit benefit to the employer

The implicit benefit represents the additional benefit necessary to ensure that benefits exceed costs to employers. The underlying logic for this is that training does take place and therefore there must be other benefits to employers that are not quantifiable under the data items collected on the data sheet for this project. Interviews undertaken with employers provide some evidence for the types of implicit benefits employers receive. One such example is employers training 'to give back to the industry'.

Opportunity cost to the apprentice

Apprentices incur costs for undertaking training instead of choosing some other activity such as working. To this end, opportunity costs were calculated by estimating the potential wages that could have been earned had the apprentice decided to work instead of undertaking training. In considering the calculation of apprentice opportunity costs, the age of apprentices was taken into account and unskilled youth wages were used for two of the years of the apprenticeship. Unskilled workers wages were used for the remaining two years.

Data were sourced from the Australian Bureau of Statistics (ABS) Survey of Employee Earnings and Hours (2006), which provided the average weekly ordinary time cash earnings for full-time males in Australia by selected occupations (ANZSCO, 4-digit 8211, 8999[2]). The occupations were selected from the ANZSCO classifications to represent an unskilled person working in the same area of work to the apprentice. For example, ANZSCO Unit Group '8211: Building and plumbing

[2] ANZSCO = Australian and New Zealand Standard Classification of Occupations; 8211: Building and plumbing labourers; 8999: Other miscellaneous labourers.

labourers' includes occupations such as an unskilled plumber's labourer or plumber's assistant. Work at this level (skill level 5) would be similar to that undertaken by the apprentice had they *not* chosen to undertake their apprenticeship. For the electrical apprentices, the ANZSCO Unit Group '8999: Other miscellaneous labourers' was selected and includes electrical or telecommunications trades assistant, again skill level 5, which is commensurate with Australian Qualifications Framework (AQF) certificate I or compulsory secondary education.

As apprentice wages were not collected for the hosted apprentices, a proxy opportunity cost was calculated using the average opportunity cost for all directly hired apprentices.

Implicit value of future benefits to the employee

The rationale employed here is that apprentices undertake training because there is a perceived future benefit to them. Future benefits come in many forms, but largely encompass economic benefits such as increased wages on completion, as well as increased employability. Other benefits may include improvements in self-esteem and higher job satisfaction. In this ledger we calculate the implicit value of future benefits as a residual such that benefits balance costs. So the value is actually a lower bound of the value of future benefits, as perceived by the apprentice.

Populating the ledgers

Due to the relatively small number of case studies, the simplest way of presenting the data is to provide them for each case study. We first present the employer ledgers and then those of the apprentices.

Employer costs and benefits

Tables 3 to 8 summarise individual employer costs and benefits.

The case studies are made up of four direct-hire apprentices and two apprentices hosted by group training organisations. Apprentices were undertaking Certificate III in Electrotechnology Systems Electrician or Certificate III in Electrotechnology Refrigeration and Air Conditioning and Certificate III in Plumbing. Refer to appendix 1 for further details of the companies involved in the research project.

Table 3 Ledger of employer costs for hiring an apprentice in the electrical industry through direct hire: Case study one

Employer costs		Employer benefits	
Apprentice wages	$159 998.00	Government incentives	$12 558.00
Training fees	$1 761.00	Other incentives	$0.00
Apprentice supervision costs	n/a	Productive contribution of apprentice	$120 950.00
Administration costs	n/a	Implicit benefits	$28 251.00
Extra maintenance and materials wastage	n/a		
Total costs	**$161 759.00**	**Total benefits**	**$161 759.00**

Table 4 Ledger of employer costs for hiring an apprentice in the electrical industry through direct hire: Case study two

Employer costs		Employer benefits	
Apprentice wages	$109 984.00	Government incentives	$4 000.00
Training fees	$6 360.00	Other incentives	$0.00
Apprentice supervision costs	$55 000.00	Productive contribution of apprentice	$120 950.00
Administration costs	$4 400.00	Implicit benefits	$78 394.00
Extra maintenance and materials wastage	$13 600.00		
Travel	$9 600		
Other indirect costs	$4 400		
Total costs	**$203 344.00**	**Total benefits**	**$203 344.00**

Table 5 Ledger of employer costs for hiring an apprentice in the electrical industry through direct hire: Case study three

Employer costs		Employer benefits	
Apprentice wages	$109 872.00	Government incentives	$5 250.00
Training fees	$1 550.00	Other incentives	$0.00
Apprentice supervision costs	$72 853.00	Productive contribution of apprentice	$120 950.00
Administration costs	$9 696.00	Implicit benefits	$74 171.00
Extra maintenance and materials wastage	$6 400.00		
Total costs	**$200 371.00**	**Total benefits**	**$200 371.00**

Table 6 Ledger of employer costs for hosting an apprentice in the electrical industry through a group training company: Case study four

Employer costs		Employer benefits	
Group training fee	$233 443.00	Government incentives	$3 952.00
Apprentice supervision costs	$27 750.00	Other incentives	$0.00
Administration costs	$3 600.00	Productive contribution of apprentice	$120 950.00
Extra maintenance and materials wastage	$800.00	Implicit benefits	$140 691.00
Total costs	**$265 593.00**	**Total benefits**	**$265 593.00**

Note: Government incentives are paid to the employer. Usually these are paid to the group training company as they are the direct employers of the apprentice.

Table 7 Ledger of employer costs for undertaking training in the plumbing industry through a group training company: Case study five

Employers costs		Employers benefits	
Group training fee	$139 563.00	Government incentives	$0.00
Training fees	$165.00	Other incentives	$0.00
Apprentice supervision costs	$56 368.00	Productive contribution of apprentice	$113 318.00
Administration costs	$615.00	Implicit benefits	$83 393.00
Extra maintenance and materials wastage	$0.00		
Total costs	**$196 711.00**	**Total benefits**	**$196 711.00**

Note: All government incentives are paid to group training company as they are the direct employers of the apprentice.

Table 8 Ledger of employer costs for undertaking training in the plumbing industry through direct hire: Case study six

Employer costs		Employer benefits	
Apprentice wages	$118 181.00	Government incentives	$2 475.00
Training fees	$0.00	Other incentives	$0.00
Apprentice supervision costs	$106 600.00	Productive contribution of apprentice	$113 319.00
Administration costs	$10 400.00	Implicit benefits	$135 554.00
Extra maintenance and materials wastage	$4 850.00		
Travel costs	$11 317.00		
Total costs	**$251 348.00**	**Total benefits**	**$251 348.00**

There are two issues we wish to pursue, both relating to the fact that the apprenticeships are conducted over four years. The first relates to the pattern of costs, and how the pattern differs between direct-hire apprentices and those employed by group training companies. The second considers how apprentice productivity increases as the apprentice acquires skills and experience.

The pattern of costs

Although there was some variation between the case studies in terms of the costs expended on each item, there is enough uniformity to draw out similar patterns in costs over time. Figure 1 shows the typical pattern for direct-hire apprentices, where the most expensive item for employers is apprentice wages, which increase over time. The second most expensive cost for employers is supervision of the apprentice by another fully qualified worker, which decreases over time. As the apprentice acquires more skills, direct supervision declines. Figure 1 also shows the other common costs for employers associated with apprentices: administration costs, extra maintenance and materials wastage. These costs vary slightly among the case studies, but are not significant for any of the employers.

The ledgers constructed for this report assume that an apprentice completes his or her training (and take four years to do so). If the apprentice fails to complete, then the relative costs to the employer are higher because the employer incurs the very high supervisory costs of the early part of the apprenticeship without enjoying the productivity of the later years.

Figure 1 Pattern of employers' typical costs associated with directly hiring an apprentice over four years

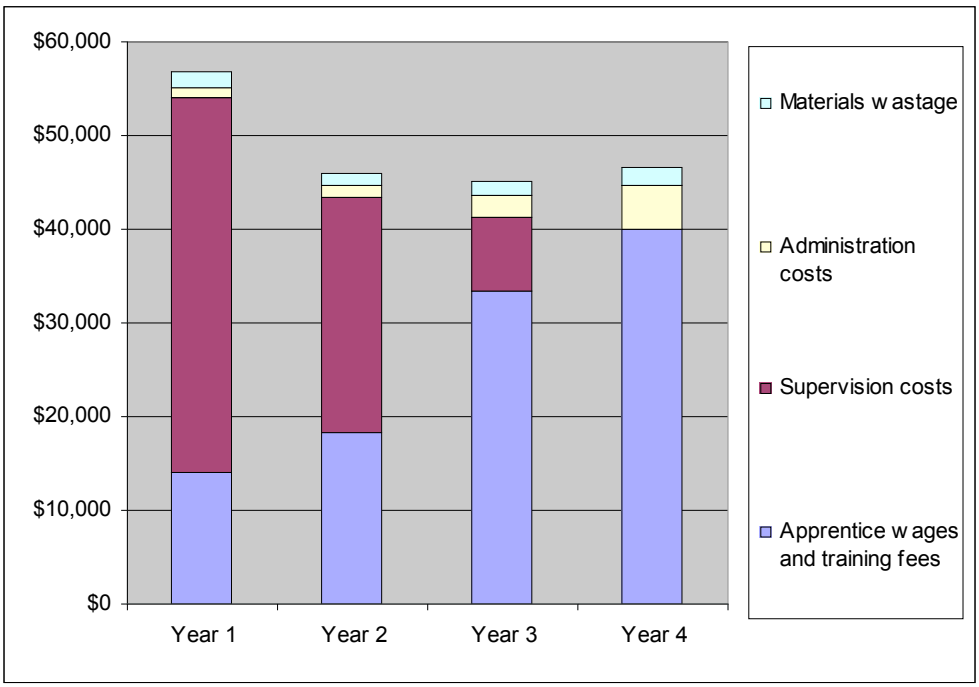
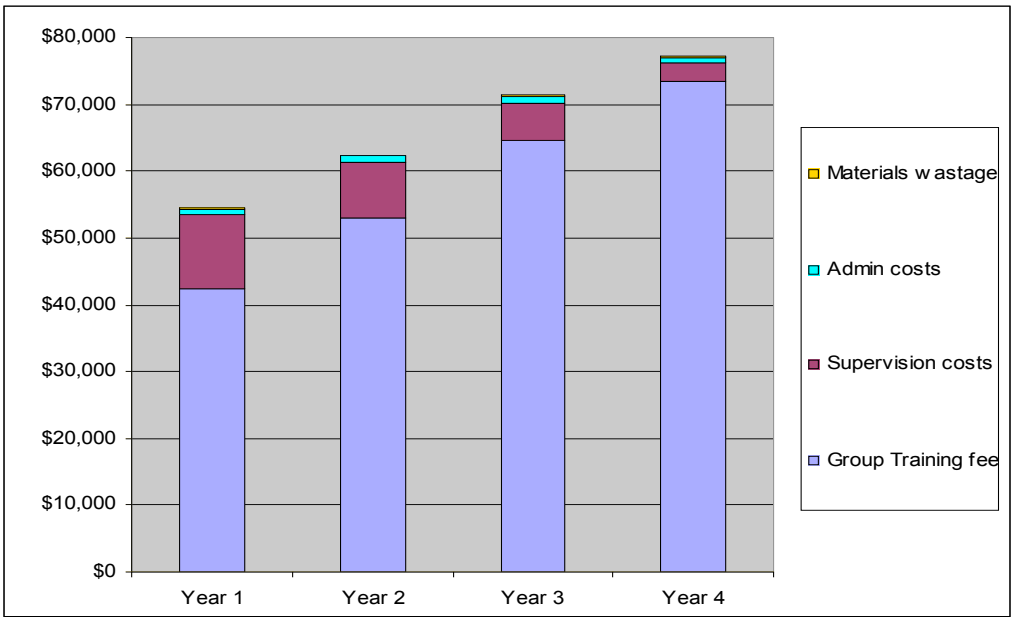


Figure 2 shows the typical employer costs for hosted apprentices, where the most expensive item is the group training fee, which increases over time. This fee includes apprentice wages and allowances, superannuation and other costs associated with employing an apprentice; it also includes any administration costs such as timesheets. As with direct-hire apprentices, supervision is the second most expensive item, which again decreases over time. Supervision costs are lower for the hosted apprentices compared with the direct-hire apprentices and this may be in part due to the screening process, as well as the extra pastoral care provided by some group training companies. Other costs such as administration and materials wastage are minimal and account for less than 2% of employer costs.

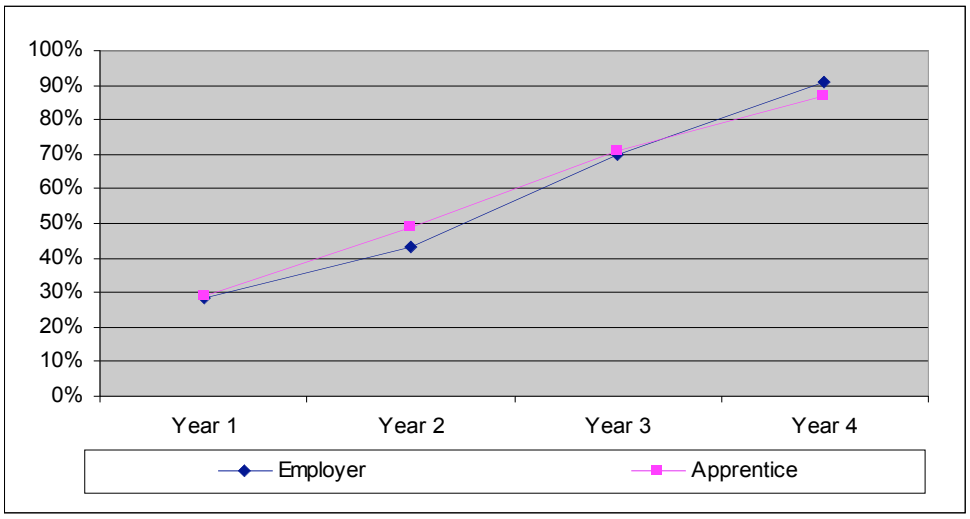
Figure 2 Typical employer costs for hosted apprentices



Productivity

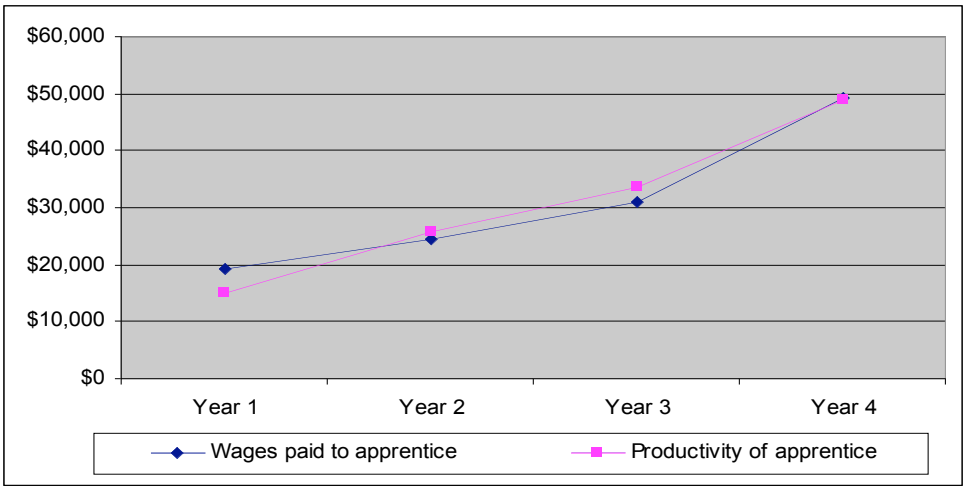
To establish productivity, employers and apprentices were asked to give an estimate of apprentice productivity compared with the productivity of a fully qualified worker. The comparison of perceived apprentice productivity between both employers and apprentices is almost identical. Both agree that the productive contribution increases over time and at about the same rate. This reflects the acquisition of skills by the apprentice and their ability to apply them on the job.

Figure 3 Perceived apprentice productivity: Employers and apprentice



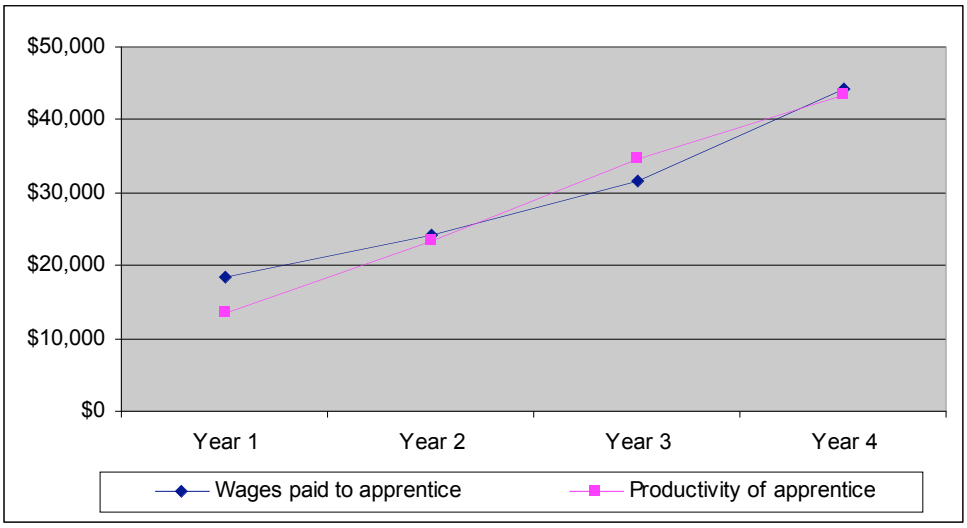
As the apprentice moves through their training, their productivity increases to just under the rate of a fully qualified worker. This is similar for both industries. When the actual wages paid to apprentices are compared with the estimated productivity, the results show a very close relationship (figure 4).

Figure 4 Electrical apprentice: Wages versus productivity



It appears that the wage structure of apprenticeships is an accurate reflection of their productivity, as wages match productivity almost exactly.[3] Therefore, the major issue of cost to employers lies in the other costs, of which supervision and administration are the major.

Figure 5 Plumbing apprentice: Wages versus productivity



[3] The pattern we find is at variance with the standard economic model, in which wages exceed productivity early on in the apprenticeship and productivity exceeds wages in the latter years. We hazard a guess that the standard model does not apply because the contract of training can be broken by the apprentice and therefore employers must pay wages equivalent to their productivity in the last year or two of the apprenticeship.

Apprentice costs and benefits

We now present data from the apprenticeship perspective for each case study (tables 9–14).

Table 9 Ledger of apprentice costs for undertaking training in the electrical industry through direct hire: Case study one

Apprentice costs		Apprentice benefits	
Training costs for on-the-job training	$995.00	Incentives paid to apprentice (Tools for Your Trade)	$800.00
Costs such as tools, text books etc.	$2 950.00	Allowances/tax rebates	$0.00
Travel to and from training	$428.00	Implicit benefits	-$7 401.00
Opportunity cost	-$10 973.00		
Total costs	**-$6 601.00**	**Total benefits**	**-$6 601.00**

Table 10 Ledger of apprentice costs for undertaking training in the electrical industry through direct hire: Case study two

Apprentice costs		Apprentice benefits	
Training costs for on-the-job training	$360.00	Incentives paid to apprentice	$0.00
Costs such as tools, text books etc.	$4 700.00	Allowances/tax rebates	$0.00
Travel to and from training	$1 040.00	Implicit benefits	$34 028.00
Opportunity cost	$27 928.00		
Total costs	**$34 028.00**	**Total benefits**	**$34 028.00**

Table 11 Ledger of apprentice costs for undertaking training in the electrical industry through direct hire: Case study three

Apprentice costs		Apprentice benefits	
Training costs for on-the-job training	$0.00	Incentives paid to apprentice	$0.00
Costs such as tools, text books etc.	$1 250.00	Allowances/tax rebates	$0.00
Travel to and from training	$1 900.00	Implicit benefits	$36 879.00
Opportunity cost	$33 729.00		
Total costs	**$36 879.00**	**Total benefits**	**$36 879.00**

Table 12 Ledger of apprentice costs for undertaking training in the electrical industry through a group training company: Case study four

Apprentice costs		Apprentice benefits	
Training costs for on-the-job training	$0.00	Incentives paid to apprentice	$0.00
Costs such as tools, text books etc.	$1 800.00	Allowances/tax rebates	$0.00
Travel to and from training	$0.00	Implicit benefits	$20 334.00
Opportunity cost	$18 534.00*		
Total costs	**$20 334.00**	**Total benefits**	**$20 334.00**

Notes: All training was paid for by the group training company. All text books were paid for by the Construction Industry Training Board, so costs are not included. Other costs include battery drill $600; peer tool kit $800; safety tool kit supplied by group training company; $200 per year for upkeep.
*This figure is an average opportunity cost for all apprentices involved in the study.

Table 13 Ledger of apprentice costs for undertaking training in the plumbing industry through a group training company: Case study five

Apprentice costs		Apprentice benefits	
Training costs for on-the-job training	$0.00	Incentives paid to apprentice	$0.00
Costs such as tools, text books etc.	$1 220.00	Allowances/tax rebates	$0.00
Travel to and from training	$0.00	Implicit benefits	$19 754.00
Opportunity cost	$18 534.00*		
Total costs	**$19 754.00**	**Total benefits**	**$19 754.00**

Note: *This figure is an average opportunity cost for all apprentices involved in the study.

Table 14 Ledger of apprentice costs for undertaking training in the plumbing industry through direct hire: Case study six

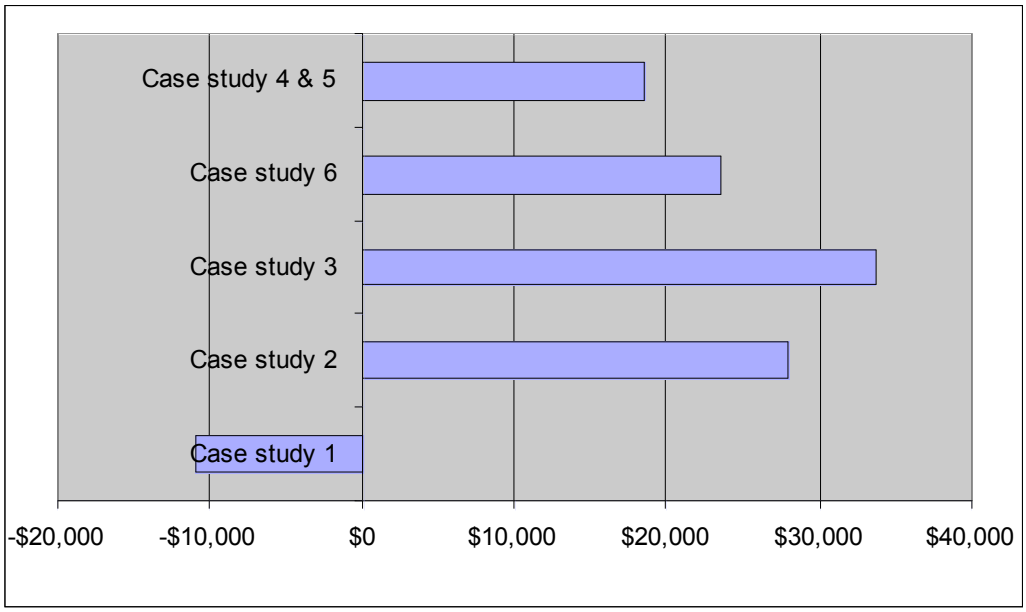
Apprentice costs		Apprentice benefits	
Training costs for on-the-job training	$1 737.00	Incentives paid to apprentice	$0.00
Costs such as tools, text books etc.	$7 500.00	Allowances/tax rebates	$0.00
Travel to and from training	$1 200.00	Implicit benefits	$33 887.00
Opportunity cost	$23 450.00		
Total costs	**$33 887.00**	**Total benefits**	**$33 887.00**

What emerges from these tables is the importance of the opportunity cost on one side of the ledger and the implicit benefits on the other. We consider each of these in more detail.

Opportunity cost to apprentices

When apprentices choose to undertake training, they give up other possible options. This is referred to as the 'opportunity cost'. Our calculations assume that the apprentices were in employment for the full four years of their apprenticeship and would have been on junior wages for two years and on the wages of an unskilled worker in the same field for the other two years. Figure 6 extracts our calculations for each of the case studies. In five out of the six case studies, the opportunity costs are quite substantial. However, they would be understated if the apprentice were older and therefore would have been on adult wages for the whole four years. On the other hand, if the alternative to the apprenticeship were a long period of unemployment, then the opportunity cost would be overstated.

Figure 6 Opportunity cost to apprentices



Note: An average of the opportunity cost was used as a proxy for the hosted apprentices, as data on apprentice wages was not available from employers.

The sensitivity of the opportunity cost to assumptions about the counterfactual can be seen from table 15. We see that if the alternative to an apprenticeship is unemployment (that is, the Newstart Allowance) or full-time study (say at school or at a technical and further education [TAFE] institute), then there is no opportunity cost associated with the apprenticeship. On the other hand, the opportunity cost is very significant if the alternative is an adult unskilled wage.

Table 15 Opportunity cost to apprentices

Case study	Annual apprentice wage	Newstart Allowance	Youth wages	Average annual unskilled worker's wage	Range of opportunity cost per year	
					Lowest[(a)]	Highest[(b)]
1	$34 463.00	$11 682.00	$20 795.00	$42 645.00	-$22 781.00	$8 182.00
2	$25 492.00	$11 682.00	$22 303.00	$42 645.00	-$2 763.00	$17 153.00
3	$23 288.00	$11 682.00	$20 795.00	$42 645.00	-$559.00	$19 357.00
6	$28 990.00	$11 682.00	$23 790.00	$45 916.00	-$6 261.00	$16 926.00

Notes: (a) Lowest opportunity cost calculated by comparing annual apprentice wage with the lowest figure from annual apprentice wage column.
(b) Highest opportunity cost calculated by comparing average unskilled wage with annual apprentice wage.

Future benefits to apprentices

An underlying assumption is that apprentices balance future benefits against immediate costs. These benefits mainly take the form of higher wages, but other benefits, such as increased employment stability and higher job satisfaction, may also result from undertaking training. As with the opportunity cost of undertaking an apprenticeship, the value of future benefits depends on the counterfactual. The most obvious counterfactual is an unskilled worker in the same occupation. Table 16 shows average weekly earnings for relevant occupations.

Table 16 Average weekly ordinary time earnings for selected occupations ($)

Electricians	$1 093.00
Plumbers	$901.00
Air conditioning and refrigeration mechanics	$847.00
Building and plumbing labourers	$883.00
Other miscellaneous labourers	$820.00

Source: ABS (2006).

We see that the margin for skill is very substantial for electricians (at least $200 per week), but less so for refrigeration mechanics. In looking at the financial incentives for an individual deciding on an apprenticeship, we need to look at the ratio of future benefits against costs. We do this by constructing scenarios for each of our case studies. In our case studies we assume that the alternative would have been two years on youth wages and two years on the wages of an unskilled worker. We then work out the pay-back period, based on the premium a skilled tradesperson gets relative to an unskilled worker in the same occupation. The calculations are shown in table 17.

Table 17 Opportunity cost and pay-back time for apprentices (youth wage scenario)

Case study	Average annual unskilled worker's wage	Average annual wage skilled worker	Opportunity cost for youth wages and unskilled worker wages (2 yrs each)	Pay-back time (years)
1	$42 645.00	$56 815.00	-$10 973.00	-0.8
2	$42 645.00	$44 018.00	$27 928.00	20.3
3	$42 645.00	$56 815.00	$33 729.00	2.4
4	$42 645.00	$56 815.00	$18 534.00	1.3
5	$45 916.00	$46 847.00	$18 534.00	19.9
6	$45 916.00	$46 847.00	$23 450.00	25.2

Case studies one, three and four (electrical) have the shortest pay-back period according to the youth wage scenario. In these cases the apprenticeship is a good investment. However, the pay-back period is quite sensitive to assumptions underlying the premium associated with being a skilled worker. Thus, the pay-back period for case studies two, five and six (refrigeration and plumbing) suggests that the apprenticeship is not such a good investment.

Table 18 Opportunity cost and pay-back time for apprentices (adult wage scenario)

Case study	Average annual unskilled worker's wage	Average annual wage skilled worker	Average annual apprentice wage	Opportunity cost	Pay-back time (years)
1	$42 645.00	$56 815.00	$34 463.00	$32 728.00	2.3
2	$42 645.00	$44 018.00	$25 492.00	$68 613.00	50.0
3	$42 645.00	$56 815.00	$23 288.00	$77 430.00	5.5
4	$42 645.00	$56 815.00	$28 058.00	$61 618.00	4.3
5	$45 916.00	$46 847.00	$28 058.00	$61 618.00	66.2
6	$45 916.00	$46 847.00	$28 990.00	$67 702.00	72.7

Table 18 outlines the findings from the adult wage scenario. The apprenticeship is still attractive for case studies one, three and four (electrical), but very unattractive for case studies two, five and six. The point to emerge from these case studies is that the benefit of doing an apprenticeship is very sensitive to the premium attached to being a qualified tradesperson and the alternative to the apprenticeship.

Discussion

There are three issues that warrant further discussion. The first is the different cost structure associated with directly hiring an apprentice compared with hosting an apprentice through a group training company. The second is that the four-year structure of the apprenticeship imposes significant costs on employers. Consequently, we consider the possibility of shifting the balance of on-the-job training and institution-based training and the effects of this on overall costs. The reasons for considering an alternative model lie in the substantial burden of costs on employers for training apprentices. Finally, we discuss the government contribution to the costs of an apprenticeship.

Hosting versus direct hire

As can be seen from figure 1 presented earlier, the cost of direct hire is fairly constant over the four years, but the supervision cost drops over the four years. The total cost does not change a great deal, because the drop in supervision costs is matched by an increase in wage costs (which can largely be ignored because of the increase in productivity of the apprentice). By contrast, figure 2 shows the cost of hosting an apprentice (that is, the employer is the group training company which receives payment from the host employer) increases each year. The supervisory costs for the host are modest—presumably the group training company incurs some of these costs by processes they utilise. Employers reported that group training companies undertook a rigorous screening process and offered extra pastoral care if required. Another benefit reported by employers was the flexibility of being able to return an apprentice if they run out of productive work. This allows employers to maximise the money they spend on training, as they can access apprentices at different levels for different lengths of time as required. Thus it appears that the group training company has structured its charge-out rate so that the cost to the host is more clearly aligned to the productivity of the apprentice, and the extra cost in the early years is recouped by the group training company in the latter years. It is also clear that the apparent higher cost of the group training model reflects the 'premium nature' of the service provided.

Comments by the employers in our case studies make it clear why both models exist. Reasons for choosing to directly hire apprentices are mostly centred on having more control over the training and management of their apprentice and perceptions of lower cost. A fairly large electrical company, which traditionally directly recruited its apprentices, had weighed up some of the advantages and disadvantages of taking group training apprentices:

> … we have just completed the budget for next year and that did actually come up—suggesting that we look at taking on two … group training apprentices because the financial benefits probably outweigh the benefits of having our own guys as well. But we don't want to lose that control … with group training, I suppose, they can up and leave at any time for whatever reason. Also, we still invest some internal in-house training on the apprentice—little quirks that we have found are best practice and which we train our apprentices in, and we don't want them then to disappear across to some other [competing company].

Reasons for choosing to host apprenticeships mostly centred on flexibility of employment—the ability to move apprentices into and out of the company (dictated by workloads and compatibility with company requirements), the convenience of having recruitment and administration handled by a group training organisation, and the perceived cost benefit:

> I see a massive advantage with GTOs [group training organisations]—we can use them as a pool of people so that when I am in trouble and I need five extra guys I can rely on them [group training organisations]—giving me five across the spread of apprentices. And when we are quiet, they'll take five back. But it is not our intention for that to happen, we normally employ about six apprentices per year and our intention when we employ those apprentices is that they are going to be with us for four years.

Another benefit to employers who hosted apprentices was that most of the apprentices had undertaken at least a six-month prevocational training course and as a consequence of this course had some basic skills and work experience in the industry.

> It just helps us make the assessment that they are committed, we can see their school results, they have had a little bit of on-the-job training, or a little bit of work experience across the six months they have been doing the prevoc course. They've normally done three prevoc courses; electrical, refrigeration and data, say, so they are making a choice as well. They are not just going out and being an electrician because that is the only job they can get. It's a massive advantage for both sides.

Institution-based apprenticeship training

Accelerated apprenticeships have existed for many years. In fact in 2007, 27.5% of completed apprenticeships in the trades were completed within two years (NCVER 2008). The logic of a two-year model is pretty obvious—the cost to both apprentices and employers will be lower if the period is shorter and therefore more employees might be willing to take on apprentices, a point of particular importance in an economic downturn.[4] However, if the four-year model is accelerated, there needs to be an alternative way of providing the necessary on-the-job experience obtained from a four-year apprenticeship.[5]

To this end we construct a hypothetical training model. Assume that we have a model with two years of institution-based training that covers the required off-the job training as well as a very considerable period of practice under simulated industry conditions. We assume that, after these two years of institutional training, the prospective tradesperson is as productive as a third-year, and then fourth-year apprentice, and is paid, at first, as a third-year and, subsequently, as a fourth-year apprentice. Under this scenario we construct a cost–benefit ledger for each case study. In table 19, column 2, we present a comparison of the implicit net benefits; that is, the imputed benefit that is sufficient to make it worthwhile for an employer to take on the apprentice under this scenario.

[4] Callan (2008), however, argues that the cost of an accelerated apprenticeship may not be much less that a traditional apprenticeship because of the increased costs associated with more intensive training.

[5] We speculate that this experience is obtained by current apprentices who complete their training within two years either through experience obtained before the apprenticeship or experience obtained through copious amounts of overtime.

Table 19 Imputed benefit sufficient to make taking on an apprentice worthwhile for an employer

Case study	Cost to employers: four years of hiring an apprentice[(a)]	Counterfactual: no cost to employers for years 1 and 2	Counterfactual: no cost to employers for years 1, 2 and 3
1	$159 998.00	$100 616.00	$73 903.00
2	$196 984.00	$114 965.00	$60 831.00
3	$198 321.00	$93 607.00	$49 119.00
4	$265 593.00	$148 568.00	$77 224.00
5	$196 546.00	$97 296.00	$49 857.00
6	$251 348.00	$122 702.00	$63 847.00

Note: (a) Cost to employers excludes training fees and any incentive payments received from government as well as supervision costs, and other sundry employer costs.

The two-year institutional model would appear to have many advantages from the employer's point of view. Of course, its success depends on how productive the 'third year' apprentice is. If the two years of institutional training is particularly effective, then the model will look even better, because of the higher productivity of the apprentice. If only one year of on-the-job experience is necessary before the apprentice is fully skilled, then the model would be even better, as can be seen from the third column of table 19.

However, such a model would not come without cost. Currently, the off-the-job training component of an apprenticeship is equivalent to about one year of full-time study. Under this model it would be two years, and under current arrangements it would be the government and the individual who would have to bear this cost. The government would have to bear the cost of subsidising tuition for two years rather than the current one year, and the individual would have to bear the cost of income foregone by being a full-time student for two years rather than an apprentice on first- or second-year apprentice wages.

While such a model may be more attractive to employers, it suffers from one drawback, one which it has in common with the standard apprenticeship model. This is that the number of places is constrained by the number of apprentice places offered by employers. It is entirely feasible that there would be pressure on teaching providers to offer a third or fourth 'professional' year if the number of two-year trained students looking for placements with employers exceeded the number of places offered by employers. This outcome was experienced by universities when the number of law graduates seeking to obtain a year of professional experience (needed for registration as a lawyer) exceeded the number of places offered by law firms. The response of universities was to provide the professional year themselves (with the students paying the cost of that year).

The government contribution

The government contribution to the cost of an apprenticeship is made up of incentive payments, the government funding of tuition for the off-the-job training (the tuition fees charged to students make up a very small part of the overall cost) and the cost of maintaining Australian Apprenticeship Centres. The component relevant to this study is the incentive payment, since this is directly paid to employers. Based on the figures supplied by employers, the effect of incentive payments on an employer's decision to take on apprentices could be considered minimal, as they account for 2–3% on average, as discount to employers. If the government decided to increase incentives to influence the uptake of apprenticeships, there would need to be a very significant rise in payments to employers to make more than a marginal difference to their costs.

Conclusion

The findings from the research show that apprenticeship training is not a cheap model in the trades. Despite the small number of case studies, the findings are consistent and show the main cost to employers to be in the supervision of the apprentice. The effects of government incentives are generally minimal. When apprentice productivity is measured against the wage paid to the apprentice, the relationship is shown to be very close. This results in employers' costs for wages effectively being neutralised by apprentice productivity. Thus supervision remains the highest cost for employers.

For apprentices the main cost is opportunity cost, which is the cost of foregone potential wages. The pay-back time varies, depending on the alternative wage or allowance that the apprentice would have received had an apprenticeship not been taken up and the margin between wages of skilled and unskilled workers. For a young person the pay-back period is short and the apprenticeship appears to be a good investment. For an older person apprentice wages in the first and second year are low compared with the wage in an unskilled job. Therefore the critical factor is the wage margin obtained by qualified tradespeople. Unless this is considerable, undertaking an apprenticeship is a poor investment for an older person.

The case studies also show that there are significant differences in the cost, and the structure of cost, between direct-hire apprentices and those hosted by an employer through a group training organisation. The fact that both models exist indicates that both have their strengths. The 'hosted' model is a 'premium model', with the group training organisation taking responsibility for the employment contract, selection, administration, some of the supervision and pastoral care; this model also makes it easy for employers to take on or discard apprentices as necessary. By contrast, employers who have direct-hire apprentices bear these hidden costs themselves.

In terms of considering how the apprenticeship model could be developed, we show that a model which changes the balance between time with the employer and time in the institution has a very significant impact on the costs to an employer. Thus such a model is worth considering in times, such as an economic downturn, when there are insufficient employers willing to take on an apprentice. However, such a model also has implications for individuals and governments: while the cost may go down for employers, it would increase for both individuals and the government as the main funders of training institutions.

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Appendix 1: Details of case studies

	Industry sector	Description of company and nature of work	Qualified tradespersons	Apprentices	Other (admin., etc.)	Total (all employees)	Type of apprentice in study
Case study 1	Electrical	A medium-sized company involved in installation and servicing of electrical equipment	23	14	3	39	Directly recruited
Case study 2	Refrigeration	A medium-sized company involved in installation and servicing of refrigeration equipment	18	9 (all direct)	11	38	Directly recruited
Case study 3	Electrical	A small company involved in installation and servicing of electrical equipment (90% commercial 10% domestic)	13	7	9	29	Directly recruited
Case study 4	Electrical	A large company involved in installation and servicing of electrical equipment	90	45 (40 GTO; 5 direct)	Not stated	Not stated	Group training
Case study 5	Plumbing	A large company involved in installation and servicing of plumbing—mainly contracted work for the commercial sector	Not stated	45–50	Not stated	160	Group training
Case study 6	Plumbing	A small company involved in installation and servicing of plumbing specialising in a particular type of product	6	3 (all direct)	2	11	Directly recruited

Appendix 2: Data collection sheets

DETERMINING EMPLOYER COSTS FOR TRAINING APPRENTICES

EMPLOYER DATA COLLECTION SHEET

Please refer to 'Guidelines' for clarification of definitions and calculations.

Your name:			
Business name:			
Address of business:		**Postcode:**	
		Phone:	
In what industry area do you conduct your business?			
Name of apprentice for whom data is provided:		**Date apprenticeship commenced:**	

PART A: DIRECT COSTS	Year of Apprenticeship			
	1st	2nd	3rd	4th
Apprentice hired by employer				
Gross annual wage	$	$	$	$
Required allowances	$	$	$	$
Please describe:				
Voluntary allowances	$	$	$	$
Please describe:				
Superannuation	$	$	$	$

Worker's compensation	$	$	$	$
Payroll tax	$	$	$	$
Apprentice hired through Group Training Company				
Group Training Fee	$	$	$	$
Other costs associated with apprentice not covered by Group Training Company.	$	$	$	$
Please describe:.....				

PART A: DIRECT COSTS	Year of Apprenticeship			
	1st	2nd	3rd	4th
Training costs for off-the-job training:				
Off-the-job training fees	$	$	$	$
Any other training fees paid for by employer	$	$	$	$
Please describe:.....				
Other direct costs, not specified above				
Please describe:.....	$	$	$	$

Comments PART A:

PART B: PAYMENTS FOR APPRENTICESHIP	Year of Apprenticeship			
	1st	2nd	3rd	4th
Funding, incentives, rebates, or other payments received from Commonwealth or State Government or other organisations (include funding already received or still to be paid).	$	$	$	$
Please describe:.....	$	$	$	$

Comments PART B:

PART C: INDIRECT COSTS	Year of Apprenticeship			
	1st	2nd	3rd	4th
Gross annual wage of fully qualified worker supervising the apprentice	$	$	$	$
% of the above worker's time spent supervising the apprentice	%	%	%	%
Time spent on administration of the apprentice (hours per year)	hrs	hrs	hrs	hrs
Administration costs associated with the apprentice	$	$	$	$
Maintenance and repair associated with the apprentice	$	$	$	$
Materials wastage associated with the apprentice	$	$	$	$
Tools purchased for the apprentice by the employer (employer not reimbursed by apprentice)				
Apprentice travel costs paid for by employer (e.g. if apprentice is paid to travel to a rural location).	$	$	$	$
Are there any other indirect costs associated with the apprentice? Please describe:.....	$	$	$	$

Comments PART C:

PART D: PRODUCTIVE CONTRIBUTION OF APPRENTICE	Year of Apprenticeship			
	1st	2nd	3rd	4th
Apprentice's output as a % of a fully qualified worker's output	%	%	%	%

Comments PART D:

PART E: OTHER INFORMATION

Please provide below any explanations or further information that you feel is relevant to determining employer costs for training apprentices.

DETERMINING EMPLOYER COSTS FOR TRAINING APPRENTICES

GUIDELINES

Please refer to these guidelines for clarification when determining required costs to be entered on the 'Data Collection Sheet'.

PART A: DIRECT COSTS

Item	Description
Gross annual wage	The minimum gross annual wage paid to the apprentice (for the specific year of apprenticeship). This is to exclude leave entitlements, superannuation, allowances, worker's compensation, and payroll tax as these are listed separately.
Required allowances	Cost of allowances paid to the apprentice over and above gross wages, as set out in relevant legislation, industry award or workplace agreement. For example: allowances for tools, special equipment, specified work conditions.
Voluntary allowances	Cost of voluntary allowances paid by the employer to the apprentice. For example: voluntary wages paid above the minimum award wage specified in relevant legislation, industry award or workplace agreement.
Superannuation	Cost of employer superannuation contributions attributable to the apprentice.
Worker's compensation	Cost of workers compensation attributable to the apprentice.
Payroll tax	Cost of payroll tax attributable to the apprentice.
Group Training Fee	Cost of fees paid by employers to a Group Training Company.
Other costs associated with apprentice not covered by Group Training Company	Any other costs associated with apprentice not paid for by Group Training Company.
Off-the-job training fees	Any fees paid by the employer to an external training provider, but excluding payments to Group Training Companies or time spent supervising or managing the apprentice (as included in PART C).
Other off-the-job training fees	Other off-the-job training expenditure for the apprentice not included above.
Other direct costs not specified above	Other direct costs not specified above.

PART B: PAYMENTS FOR APPRENTICESHIP

Item	Description
Funding, incentives, rebates, or other payments received from Commonwealth or State Government or other organisations	The value of any Commonwealth or State Government Funding, incentives, and assistance received or due to the employer in respect of the apprentice. Please describe. This may include assistance with costs of formal training; worker's compensation and/or payroll tax exemptions; wage subsidies; other financial incentives (such as disability incentives); and commencement, progression, and completion payments.

PART C: INDIRECT COSTS

Item	Description
Gross annual wage of fully qualified worker supervising the apprentice	Gross annual wage of fully qualified worker supervising the apprentice including on-costs. On-costs being payroll tax, worker's compensation, superannuation, and all leave entitlements/provisions.
% of worker's time supervising the apprentice	% of worker's time spent supervising the apprentice, where more than one apprentice is supervised only % related to this apprentice.
Time spent on administration of the apprentice	Annual time spent on administration of the apprentice shown as hours per year (e.g. time spent developing training plans, scheduling work and organising off the job training etc). This excludes on-the-job supervision.
Administration costs associated with the apprentice	Annual costs of the administration as described above.
Maintenance and repair associated with the apprentice	An estimate of the additional cost of maintenance and repair attributable to the apprentice, due to mistakes etc.
Materials wastage associated with the apprentice	An estimate of the additional cost of wastage attributable to the apprentice, due to mistakes etc.
Tools purchased for the apprentice	Any tools specifically purchased by the employer for the apprentice, for which the employer is not reimbursed.
Apprentice travel costs	Any travel costs paid for by the employer associated with the apprentice, such as travel by the apprentice to a rural location.

PART D: PRODUCTIVE CONTRIBUTION OF APPRENTICE

Item	Description
Apprentice's output as a % of a Fully Qualified Worker's output.	Apprentice's output as a percentage of a fully qualified worker's output.

DETERMINING APPRENTICE COSTS FOR TRAINING

APPRENTICE DATA COLLECTION SHEET

Please refer to research team for clarification or questions. Please fill in participant details and boxes.

PARTICIPANTS DETAILS			
Apprentice name:			
Date of birth:			
Contact details:			
Workplace name:			
Address of workplace:		**Postcode:**	
		Phone:	
Date apprenticeship commenced:			
What qualification did you complete?			
Were there any reductions in the term of your apprenticeship or the amount of training you had to do? Give reasons?			
What is the highest level of school you have completed?			
Have you commenced any prior training? If so give title and outcome (complete or not complete) of prior training.			

APPRENTICE COSTS	Year of Apprenticeship			
	1st	2nd	3rd	4th
Training costs for off the job training:				
Any fees and charges associated with training not covered by group training company or employer.	$	$	$	$
Please describe:				
Any costs associated with apprenticeship such as tools, safety equipment, text books or technical reference books not paid for by employer or group training company.	$	$	$	$
Please describe:				

Any costs associated with travelling to and from training location, not covered by employer or group training company.	$	$	$	$
Please describe:				
Other costs, not specified above.				
Please describe:				

PRODUCTIVE CONTRIBUTION OF APPRENTICE	Year of Apprenticeship			
	1st	2nd	3rd	4th
How productive do you think you were in comparison to the output of a fully qualified worker (as a percentage)	%	%	%	%

ADDITIONAL COMMENTS: **Is there any other information you think is relevant to the topics covered?**