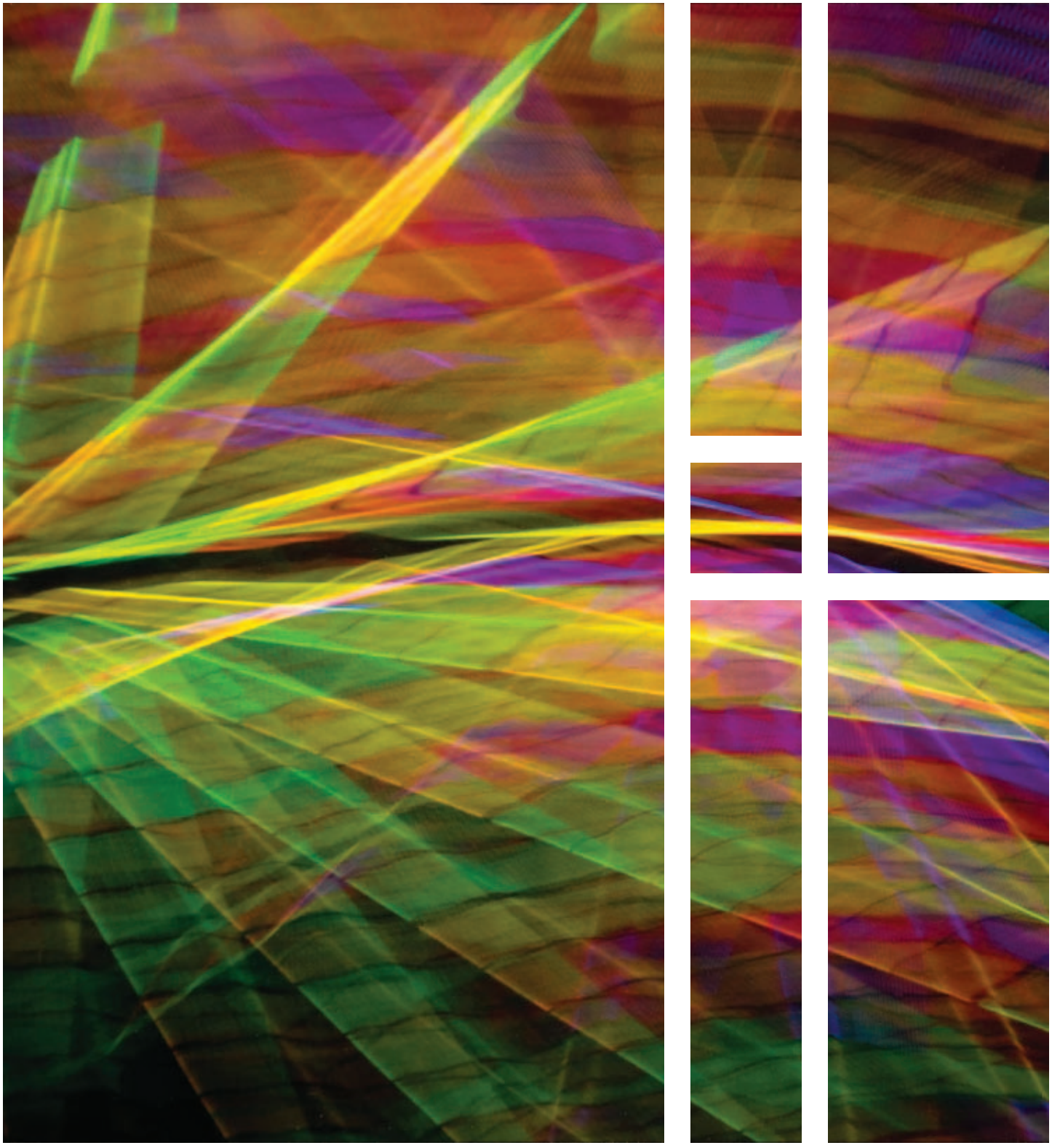


The impact of wages on the probability of completing an apprenticeship or traineeship

Tom Karmel
Peter Mlotkowski
National Centre for Vocational Education Research

NCVER MONOGRAPH SERIES 04/2010

NCVER

Australian Government
Department of Education, Employment and Workplace Relations

Cover design using artwork from the ***'Spun Light'*** *series by Marie Watt*

Right from the time that we are small, 'spin' holds an attraction. Think of the childhood delight of a swirlingly multicoloured lollipop, of whirlygigs, or circus performers spinning through the air . . . and fairground rides.

In this work I have used 'spin' associated with the imagination and fantasy of the fairground as a metaphor for truth in contemporary life. My digital camera is capturing light over time. My camera is thus allowing us an insight, via these unmanipulated images, into something that is happening in the world in a way that we cannot see it.

This work is from NCVER's collection which features artwork by VET students.

NCVER

The impact of wages on the probability of completing an apprenticeship or traineeship

Tom Karmel

Peter Mlotkowski

National Centre for Vocational Education Research

This document should be attributed as Karmel, T & Mlotkowski, P 2010, *The impact of wages on the probability of completing an apprenticeship or traineeship*.

The National Centre for Vocational Education Research (NCVER) is an independent body responsible for collecting, managing and analysing, evaluating and communicating research and statistics about vocational education and training (VET).

NCVER's inhouse research and evaluation program undertakes projects which are strategic to the VET sector. These projects are developed and conducted by the NCVER's research staff and are funded by NCVER. This research aims to improve policy and practice in the VET sector.

NCVER Monograph Series

In 2007 the NCVER Board agreed to establish an editorial board to peer-review work commissioned or undertaken by NCVER for publication in a monograph series. Each contribution to the NCVER Monograph Series is reviewed by two editorial board members or their nominees. Where work is authored by NCVER, both reviews are undertaken by external people. Research accepted for publication in the NCVER Monograph Series will assist university-based researchers to make use of their NCVER-published work in the Research Publications Return of the Higher Education Research Data Collection and in Excellence in Research for Australia evaluations. The members of the editorial board include:

ISSN 1837-0659

ISBN 978 1 921413 98 8 web edition
978 1 921413 97 1 print edition

TD/TNC 101.01

Published by NCVER
ABN 87 007 967 311

Level 11, 33 King William Street, Adelaide SA 5000
PO Box 8288 Station Arcade, Adelaide SA 5000, Australia

ph +61 8 8230 8400 fax +61 8 8212 3436
email ncver@ncver.edu.au
<http://www.ncver.edu.au>
<http://www.ncver.edu.au/publications/2277.html>

About the research

The impact of wages on the probability of completing an apprenticeship or traineeship

Tom Karmel, Peter Mlotkowski, NCVER

Low completion rates in apprenticeships and traineeships have been of concern for many years. Explanations have been the low level of apprentice and trainee wages on one hand, and other factors such as the quality of workplaces and training, on the other. The focus of this paper is on wages and the impact they have on the decision not to continue with an apprenticeship or traineeship.

Key messages

- For most apprentices and trainees, expected wages in alternative employment are greater than wages during training. Apprentices and trainees are indeed being paid a training wage.
- Only for trade apprentices (specifically, electrotechnology and telecommunications, construction, and automotive and engineering) do expected wages on completion significantly exceed expected wages in alternative employment. For these occupations the value of completing the qualification is high. Thus the concept of a training wage, from the point of view of an investment in skills, makes obvious sense for apprentices in these occupations but less so in other occupations.
- We find that 'wedges' between the training wage, the wage in alternative employment and the wage on completion have a limited effect on completion. For apprentices it is the premium attached to completion that matters. For male non-trade trainees the wedge between the training wage and the wage in alternative employment does have an impact on completion. For females in non-trade traineeships we found no relationship between wages and the probability of completing a traineeship.

Thus the broad conclusion is that training wages should not be the focus of attention in increasing completion rates. The study also raises the question of whether traineeships in some occupations—sales, for example—are contributing to increased skill levels in any substantive manner. It would seem that many traineeships are more about employment than skills acquisition.

Tom Karmel
Managing Director, NCVER

Contents

Tables and figures

Tables

Figures

Abstract

The primary focus of this research is the impact of wages on the decision not to continue with an apprenticeship or traineeship. The approach taken is to model three wages relevant to apprentices and trainees: the wage during training; the expected wage in alternative employment; and, the expected wage on completion. The results of these models are then used as inputs into a model which estimates the impact of wages on the final probability of completing an apprenticeship or traineeship. The models also allow for a direct estimate of the short-term value of completion to be made by looking at the differences between the wages of those who did and those who did not complete.

Overall, the conclusion is that wages do have some impact on the decision not to continue with an apprenticeship or traineeship but the effect is not consistent. Specifically, the difference between wages on completion and wages in alternative employment is significant in the trades, and the difference between wages during training and wages in alternative employment is significant for males in non-trade traineeships. For females in traineeships there is no significant relationship between wages and completion rates.

In looking at the value of completion, the major point to emerge is that apprenticeships and traineeships are a bit of a mixed bag. For trade apprentices (specifically, electrotechnology and telecommunications, construction, and automotive and engineering) expected wages on completion significantly exceed expected wages in alternative employment. For most other occupations the value of completing the qualification is modest or even negative (notably, sales). This lack of a premium attached to completion suggests that there is a range of traineeships for which there is apparently little skills acquisition during the training job, or if there is the skills are not valued by the labour market over the general work experience obtained during the traineeship.

Introduction

Any discussion on skills shortages very quickly turns to the apprenticeship and traineeship system. While occupational attrition is an important element of labour supply, the number of new entrants through the apprenticeship and traineeship system is central to occupational labour supply. In 2008, 288 400 apprentices and trainees commenced their contracts of training (NCVER 2009a). However, the completion rates (the overall rate for the cohort commencing in 2003 was 48.5%, [NCVER 2009a]) are a cause of concern, especially in occupations such as hairdressing and the food trades, where the completion rates are particularly low. In order to think about how the completion rates could be increased, it is necessary to understand why apprentices and trainees are not completing their training.

At one level, the answer is easy; apprentices and trainees do not complete their training because the alternatives are more attractive. But this is not very helpful in determining a policy response. One possible explanation is that apprentice and trainee wages are too low, and that the wages available on completion are not sufficiently high to outweigh the paucity of the training wage paid by the apprenticeship or traineeship. Other possible explanations are that apprentices and trainees find that they are not interested in the type of work they are doing, that they do not get on with their workmates, or personal factors—such as illness—intervene to make it not worthwhile continuing with the apprenticeship or traineeship.

The issue of low completion rates has been around for quite some time, and there is considerable literature on what lies behind it and what should be done about it. Some but not all studies emphasise training wages as being an issue. For example, Huntly Consulting (2008) argues that relatively low apprentice wages are a major factor behind apprenticeship attrition, especially in a resources boom; Fullager and Tonkin (2008) quote data from a survey of first year and second year apprentices who had reported that they cancelled their contracts because of low wages; Oliver (2008) refers to a number of studies which give low wages as a common reason for non-completion; Snell and Hart (2008) report low wages as one factor contributing to non-completion; and Misko, Nguyen and Saunders (2007) document apprentices' dissatisfaction with their wages. However, it is clear that other factors are also prominent and in fact the Australian Industry Group (2007) and Mitchell, Dobbs and Ward (2008) do not mention wages in providing guidance in how to retain apprentices. Rather their focus is on appropriate selection, making work meaningful, pastoral support, effective training and so on.[1] That said, clearly wages are a possible factor—the Australian Chamber of Commerce and Industry (2005) points out that employers do pay more to retain good apprentices. Cully and Curtain (2001) provide a different perspective, reporting that quite high numbers of dropouts from traineeships gave 'being used as cheap labour' as a reason for non-completion. In terms of the international literature, Bessey and Backes-Gellner (2008) use hazard functions to model behaviour, and find that financial considerations such as the opportunity cost of the training or financial stress is an important factor in dropping out. Rudd et al. (2008), in a 'rapid review' of research pertaining to apprenticeships in the United Kingdom, point to recruitment and management of the apprenticeship framework as being factors in poor retention. Wage issues are discussed in terms

[1] See also Karmel and Misko (2009) for a survey of initiatives to improve apprenticeship and traineeship completion rates.

of the return to training but are not mentioned in relationship to retention and completion. Gallacher et al. (2004) note that the factors associated with non-completion are complex, but that a supportive workplace emerged as being important from all of their interview data sets, although wages and conditions provided by some employers contribute to high levels of turnover.

The focus of this paper is on the impact of wages on the decision not to continue with an apprenticeship or traineeship. The fact that relatively few of those who withdraw give wages as the main reason (as we show in due course) does not convince us that wages are relatively unimportant. This is because reasons given for non-completion may well depend on wages. That is, the reasons given are possibly an outcome rather than a truly external factor. For example, the apprentice may give as a reason for non-completion that the work was not interesting. But, if the wages had been higher, then the apprentice may well have decided to stick it out. Thus, we are a little sceptical of the reasons given for non-completion and are more interested in trying to ascertain the impact of wages on the decision on whether to complete or not. However, an objection to this argument might be that apprentices and trainees should have a fair idea of the wages they will receive during their contract of training, and afterwards. After all, the design of the apprenticeship system is consistent with the standard human capital model in which the apprentice or trainee pays for part of the training through lower wages but is rewarded by a premium on completion (see Norris, Keyy & Giles 2005, for example). The reason that the apprentice or trainee has to accept a lower wage is that the training they receive is general, not specific to the firm, so that on completion the employer will have to pay the going rate. But training is not cost-free because of the costs of supervision and the fact that employees spend part of their time at work receiving instruction rather than undertaking productive work. Thus training wages will be lower than the wage for an unskilled worker who is not undertaking training.

On the basis that the prospective apprentice or trainee understands the relationship between the training wage and the wage premium on completion, the wage should not affect the completion rate (although the wage is likely to affect the number commencing an apprenticeship or traineeship). The rejoinder to this is to argue that the wages might be sufficient to get an individual into an apprenticeship or traineeship, but then the individual can start looking around for better offers.[2] If wages during the contract or afterwards are not particularly high, then there is a much higher probability that a better opportunity will arise. So therefore it is plausible that wages do matter, and this is a hypothesis worth testing.

The analysis makes use of data from the NCVER Apprentice and Trainee Destination Survey. This survey obtained information on a range of variables (see appendix A or NCVER 2009b) from an initial sample of 5319 individuals who either completed or withdrew from their apprenticeship or traineeship in the final quarter of 2007. Essentially, our approach is to assume that the apprenticeship and traineeship system is in a steady state and therefore we analyse this sample as if it represents a cohort of commencing apprentices or trainees.

While the sample size used is quite large, it does constrain the level of analysis. Ideally, we would have liked to undertake the analysis by the type of apprenticeship or traineeship. However, in order to keep the models reasonably robust, we disaggregate into three groups: trades, non-trades (male) and non-trades (female).

Our approach is motivated by an innate distrust of a number of the previous studies, not because they have been undertaken badly but because the usual methodology is to ask

[2] There is a whole literature on reservation wages. For example, see Cobb-Clark, Frijters and Kalb (2004) for an analysis of whether acceptable job offers arrive more frequently for those in employment than for those in unemployment. For an examination of the relationship between individual risk aversion and reservation wages, see Pannenberg (2007).

individuals about their satisfaction or their reason for not completing.[3] We know that low wages do not feature highly in reasons for not completing an apprenticeship or a traineeship, but we also know that low training wages are the most important source of dissatisfaction.[4] The issue is whether what the individuals say is reflected in actual behaviour—would have completion rates been better if training wages were higher? Or would completion rates be higher if the wages on completion were more attractive? Thus we were interested in two specific issues. The first is the extent to which completion rates are affected by wages. The second is a related issue and follows from our methodological approach. It is the premium attached to completion, as measured by the difference between wages obtained on completion and the wages that would be obtained in an alternative employment.

The structure of the paper is as follows. In next section, we provide some background data on apprenticeships and traineeships to give a broad picture of apprentices and trainees and their completion rates. The groundwork for the analytical part of the paper is given in the following section. It estimates three wages for each group of apprentices and trainees: the wage the apprentices and trainees get at each point in a training contract; the wage the apprentices and trainees would expect to get in alternative employment at each point in the training contract; and finally, the wage the apprentices and trainees would expect to get on completion of the training contract. The results indicate that the first two of these wages increase with the duration of the contract, but more so for the trades than the non-trades. In addition, undertaking a contract of training—either part-time or school-based—significantly reduces apprentice and trainee wages across the board.

Our estimated wages are next used as inputs into a model that estimates the impact of wages on the probability of withdrawal and the final probability of completion (the fourth section).[5] For most apprentices and trainees, expected wages in alternative employment are greater than wages during training, whereas only for trade apprentices do expected wages on completion significantly exceed expected wages in alternative employment. However, it appears that 'wedges' in these wages have a limited impact on completion rates. For apprentices it is the premium attached to becoming a tradesperson that matters, not the training wage. Furthermore, this appears to impact on the probability of dropping out early on during the contract of training. For males in non-trade traineeships training wages matter, but there is little premium to completion. Therefore perhaps completion is not such an issue because for most the training does not result in their getting a better-paying job. For females in non-trade traineeships we find no effect at all; wages, whether during training or the premium attached to completing the training, do not seem to be a significant factor.

The fifth section of the paper, looking at the premium attached to completion, exploits the models that we have constructed by considering the wage wedges at the occupation level. This enables us to elaborate on our broad findings and estimate the value of completing specific apprenticeships or traineeships. We find considerable variation, with an overall conclusion that almost all the trades have a significant premium attached to completion (hairdressing is the exception). However, the story is quite variable across traineeships: the only occupations for which there is a healthy premium for both males and females are manager and professional traineeships and clerical and administrative traineeships; similarly, the only occupation for which

---

[3] Bessey and Backes-Gellner (2007, 2008) are an exception. They model behaviour and find that dropout decisions are affected by financial considerations.

[4] 10.0% of those not completing a trade apprenticeship and 3.4% of males not completing a traineeship gave 'the pay was too low' as the main reason for non-completion (see table 5, p.16). Of the non-completers, 52.1% of apprentices and 40.9% of trainees as a whole reported dissatisfaction with pay, the highest level of dissatisfaction of any variable (*Apprentice and trainee destinations, 2008* [NCVER 2009b]).

[5] We acknowledge that our approach is less than perfect and that it would be better to model withdrawal as a function of the net present value of completing the apprenticeship or traineeship or the alternative. However, this is beyond us because we do not know the path of wages once the person has left the apprenticeship or traineeship.

there is a negative premium for both males and females is sales. For the other occupations the traineeship has only a modest completion premium, or a positive premium for one sex but not for the other. We conclude with a brief discussion, making the point that the findings raise questions about the level of skills acquisition in some traineeships.

Some background

The apprenticeship and traineeship system has undergone a transformation since the mid-1990s. While the fundamental model remains the same—a contract of training under which an employee receives formal training in addition to employment—its coverage has been broadened. The occupational coverage has expanded well beyond the traditional trades, which were the preserve of young men (and young women in hairdressing and the food trades). Apprentices and trainees now come from all ages and include those employed part-time as well as full-time. No longer are they restricted to new entrants, with existing workers being an important feature in a number of areas.

Tables 1 to 3 give an outline of the coverage of apprenticeships and traineeships. Table 1 provides the data for the ANZSCO[6] major group 3 (technicians and trades workers). Tables 2 and 3 present the data for other occupational groups, separately for males and females, respectively.

Table 1 In-training as at 31 December 2007 by trade occupations by selected training characteristics, Australia

	No.	Percentage of apprentices in the occupation						
		19 years and under	20 to 24 years	25 to 44 years	45 years and over	Female	Existing worker	Part-time
31 Engineering, ICT and science technicians	3 945	27	29	31	12	22	37	17
32 Automotive and engineering	55 309	45	38	15	2	2	11	3
33 Construction trades workers	53 357	47	39	13	1	1	5	4
34 Electrotechnology and telecommunications trades workers	33 078	31	46	22	1	2	7	1
35 Food trades workers	18 859	46	36	16	3	26	8	7
391 Hairdressers	13 232	62	31	6	1	93	1	7
All other trade occupations	16 879	37	37	20	6	18	17	11
Total	**194 659**	**43**	**39**	**16**	**2**	**12**	**9**	**5**

Source: NCVER, National Apprentice and Trainee Collection, March 2010 estimates, unpublished.

The table shows that on the whole the trades are dominated by young men working full-time, apart from the food trades and hairdressing. The ANZSCO major group for trades also includes engineering, information communications technology (ICT) and science technicians and these have a rather different make-up, with more older apprentices and large numbers of female, existing and part-time workers.

[6] Australian and New Zealand Standard Classification of Occupations.

Table 2 In-training as at 31 December 2007 by non-trade occupations by selected training characteristics, males, Australia

		No.	Percentage of trainees in the occupation					
			19 years and under	20 to 24 years	25 to 44 years	45 years and over	Existing worker	Part-time
1+2	Managers and professionals	6 931	8	11	51	30	77	5
4	Community and personal service workers	12 013	23	23	37	16	23	52
5	Clerical and administrative workers	19 876	9	17	55	19	58	9
6	Sales workers	16 047	42	23	27	8	35	43
7	Machinery operators and drivers	30 874	5	12	52	31	58	6
8	Labourers	16 383	29	17	37	17	23	27
Total		**102 124**	**18**	**17**	**45**	**21**	**46**	**21**

Source: NCVER National Apprentice and Trainee Collection, March 2010 estimates, unpublished.

As can be seen, male trainees tend to be older than apprentices, and large numbers of them are existing workers (the majority, in fact, in the manager and professional group, clerical and administrative workers and machine operators and drivers). Part-time trainees are important among the community and personal service workers and sales workers.

Table 3 In-training as at 31 December 2007 by non-trade occupations by selected training characteristics, females, Australia

		No.	Percentage of trainees in the occupation					
			19 years and under	20 to 24 years	25 to 44 years	45 years and over	Existing worker	Part-time
1+2	Managers and professionals	5 373	9	26	45	20	52	40
4	Community and personal service workers	31 567	25	18	33	24	27	64
5	Clerical and administrative workers	32 389	23	22	38	17	41	22
6	Sales workers	26 595	47	22	22	9	27	59
7	Machinery operators and drivers	4 495	3	12	49	36	58	16
8	Labourers	8 094	10	9	39	41	33	50
Total		**108 513**	**27**	**20**	**34**	**20**	**34**	**46**

Source: NCVER, National Apprentice and Trainee Collection, March 2010 estimates, unpublished.

The female trainees tend to be a little younger than the male trainees. Around one-third of them are existing workers and around one-half are part-time. Their occupational distribution is a little different, with much smaller proportions of machinery operators and drivers, and labourers.

We end this section by presenting completion-rate data by occupation from NCVER's apprentice and trainee collection.

Table 4 Completion rates by occupation for apprentices and trainees commencing in 2003

Occupation (ANZSCO) group	Contract completion rates	Number of contracts
	%	'000
Managers	45.7	2.4
Professionals	55.7	1.3
Technicians and trades workers	44.2	78.4
31 Engineering, ICT and science technicians	31.9	5.8
32 Automotive and engineering trades workers	51.8	19.3
33 Construction trades workers	44.7	18.4
34 Electrotechnology and telecommunications trades workers	55.1	7.9
35 Food trades workers	28.0	11.7
36 Skilled animal and horticultural workers	53.1	3.6
39 Other technicians and trades workers	43.3	11.7
391 Hairdressers	38.3	6.5
Community and personal service workers	52.7	40.7
Clerical and administrative workers	55.5	59.4
Sales workers	41.1	50.9
Machinery operators and drivers	54.2	31.9
Labourers	46.3	34.8
All occupations	**48.5**	**299.8**

Source: NCVER (2009a).

Notwithstanding the fact that some of the occupations have relatively few observations, there is considerable variability in completion rates. Among the worst are the completion rates for hairdressers and those in the food trades. Among the best are occupations in clerical and administrative workers, machinery operators and drivers, and community and personal service workers.

Modelling wages

We begin by modelling wages, those that apprentices and trainees receive and those they could expect to receive either on completion or in alternative employment. These estimated wages will then be used as inputs into a model that estimates the impact of wages on the probability of withdrawal and the final probability of completion (next section). We acknowledge that few give 'pay was too low' as the main reason for non-completion (table 5); only 10.0% of all trade non-completers give pay being too low as their main reason, while for females in the non-trades, pay being too low appears not to be significant at all.

Table 5 Main reason for non-completion, trades and non-trades (male/female)

	Trades	Non-trades (male)	Non-trades (female)
	%	%	%
Doing something different/better	23.4	38.8	34.6
Got offered a better job	*4.2*	*10.8*	*8.8*
Pay was too low	*10.0*	*3.4*	*1.5*
Poor working conditions/didn't like boss	19.1	4.7	8.8
Didn't like work or industry/transferred	16.7	9.3	7.7
Wasn't happy with training or study	7.9	5.0	10.5
Personal reasons	9.4	16.4	16.4
Lost job/made redundant	9.5	7.4	7.6
Other	13.9	18.3	14.4
Total	**100.0**	**100.0**	**100.0**

Note: The analysis in this paper uses slightly different samples for trade and non-trade contracts of training from NCVER (2009b). Hence, data in table 5 may not match the corresponding data in NCVER (2009b).

We are sceptical of this relative unimportance of wages (for reasons already discussed) and wish to conduct a more thorough analysis of the impact of wages on the decision not to complete an apprenticeship or traineeship. We begin by estimating three wages for each group of apprentices and trainees: the wage the apprentices and trainees get at each point in a training contract; the wage the apprentices and trainees would expect to get in alternative employment at each point in the training contract; and finally, the wage the apprentices and trainees would expect to get on completion of the training contract. We argue that the combination of these wages is likely to affect completion.

The approach we take is novel as far as we can tell. Typically, apprentice wages are compared with the wages of unskilled workers and the wages of skilled workers (see, for example, Nechvoglod, Karmel & Saunders 2008; Steedman 2008; Bessey & Backes-Gellner 2008). However, the Apprentice and Trainee Destination Survey provides us with data that better reflect the possibilities for those who are actually apprentices or trainees. In particular, the survey data allow us to model the alternative wage for those who drop out from their apprenticeship or traineeship and to compare it with the training wage that the apprentices and trainees in the survey actually received. We acknowledge that our approach is not perfect; it is always possible

that those who drop out differ from those who do not in ways we have not captured with our control variables.

Wages at each point in the training contract

Respondents to the Apprentice and Trainee Destination Survey provide the wage they were receiving in the last week of their apprenticeship or traineeship. For completers this is the wage they were receiving at the very end of their contract of training; for non-completers it is the wage they were receiving in the week they withdrew, which may have been at any point in time. We model this wage for each of our groups on a set of variables covering the apprentices or trainees, or their contracts of training.

Duration is entered into the models as duration for full-time and part-time contracts. Age is entered as the age of the apprentice or trainee at the commencement of their training contract to avoid correlation with duration, noting that trade apprenticeships generally take four years full-time to complete. The remaining variables are entered as binary or dummy variables: male, part-time, existing worker, high-level qualification (certificate IV or diploma, compared with certificate II or III), completed Year 12 prior to commencement, had certificate III or above post-school qualification prior to commencement, school-based, and private sector (compared with government sector or group training). Finally, dummy variables on the ANZSCO of the training contract are entered to test whether wages vary by occupation.

The models are ordinary least squares (with log wages as the dependent variable) and are statistically robust. R-squared values are relatively high at around 0.50. (Appendix B presents the models in greater detail.)

The full models are reduced by normal backward elimination with one variation. The occupational dummy variables are treated as one block of variables, and are retained or dropped, depending on whether there is sufficient variation between the values of the coefficients within the block. (The appropriate test for this is the F-test, performed when all other variables are in the model.) Table 6 summarises our results.

The results intuitively ring true: trade apprentice wages increase as apprentices get further into their training contracts, whereas for the non-trades, the duration of the training contract is not at all (males) or less so (females) important to wages; apprentice and trainee wages increase with age on commencement across the board; by contrast, school-based and part-time apprentices and trainees receive substantially lower wages; and finally, prior education appears to be more important to wages in the non-trades than the trades.

There appears to be quite a bit of variation across the different trade occupations. Apprentices in engineering, automotive, construction, electrotechnology, and food occupations all receive significantly higher wages than apprentices in the reference category of 'all other trade occupations'. For non-trade males, none of the occupations is significantly different from the reference category of managers and professionals, yet within this block there is sufficient variation between the coefficients to retain the occupational variables in the model. This isn't the case for the non-trades females and so the block of occupational dummies is dropped for the reduced model.

Table 6 Summary of regression of (log) annual wage during training, trades and non-trades (male/female)—reduced model

	Trades		Non-trades (male)		Non-trades (female)	
	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
Intercept	8.4994	0.1651	8.6578	0.1598	8.7251	0.1271
Full-time duration (days)	0.0004	$3.44*10^{-5}$	*	*	*	*
Part-time duration (days)	*	*	*	*	0.0003	0.0001
Age at commencement	0.0753	0.0116	0.0919	0.0084	0.0792	0.0084
Age at commencement (squared)	-0.0009	0.0002	-0.0010	0.0001	-0.0010	0.0001
Characteristic dummy variables:						
Male	*	*	-	-	-	-
Part-time	*	*	-0.4158	0.0500	-0.5156	0.0498
Existing worker	0.1959	0.0605	*	*	0.2049	0.0397
High-level qualification	*	*	0.1751	0.0519	*	*
Completed Year 12	*	*	0.0674	0.0353	0.1504	0.0346
Had cert. III or above post-school qual.	*	*	0.1531	0.0427	0.1673	0.0430
School-based	-0.9898	0.0812	-0.4716	0.0725	-0.6764	0.0615
Private sector	0.1249	0.0397	*	*	*	*
Occupational dummy variables:						
Trades:						
31 Engineering, ICT and science technicians	0.1612	0.0950	-	-	-	-
32 Automotive and engineering	0.2068	0.0552	-	-	-	-
33 Construction trades workers	0.1710	0.0532	-	-	-	-
34 Electrotechnology and telecommunications trades workers	0.2057	0.0630	-	-	-	-
35 Food trades workers	0.1337	0.0589	-	-	-	-
391 Hairdressers	-0.0983	0.0677	-	-	-	-
All other trade occupations	--		-	-	-	-
Non-trades:						
1+2 Managers and professionals	-	-	--		-	-
4 Community and personal service workers	-	-	-0.1157	0.0975	-	-
5 Clerical and administrative workers	-	-	-0.0236	0.0915	-	-
6 Sales workers	-	-	-0.0247	0.0992	-	-
7 Machinery operators and drivers	-	-	0.1230	0.0953	-	-
8 Labourers	-	-	-0.0399	0.0970	-	-
R-square	0.430		0.585		0.529	

Notes: * Denotes coefficient not significant at the 10% confidence level.
- Denotes variable not entered into model.
-- Denotes occupational variable used as reference, and hence not entered into model.
Appendix table B1 presents the models in greater detail.

We can explain the coefficients more intuitively by converting them to show the percentage differences in the wages from a reference category. For example, we can show how wages change with duration by comparing wages one, two and three years into the training contract with wages at the start. In the trades, wages during training increase by 17.5% after one year (full-time); after two years wages increase by 38.1% and after three years they increase by 62.3%. Age at commencement has a very significant effect on wages during training for all three groups, but especially for the non-trades. For example, trainees who commence a traineeship aged 25

years old receive more than twice the wage of trainees who commence aged 16 years old, for both males and females. Being an existing worker apprentice in the trades (as opposed to being a non-existing worker trade apprentice) increases wages during training by 21.6%. By contrast, being a school-based apprentice in the trades (as opposed to being a non-school-based trade apprentice) decreases wages by 62.8%. Table 7 also shows that part-time apprentices and trainers earn wages commensurate with their part-time status. The changes in wages across occupations are not as great but are still quite substantial.

Table 7 Impact of characteristics on annual wage during training, trades and non-trades (male/female), relative to a reference category

	Trades	Non-trades (male)	Non-trades (female)
	%	%	%
Full-time duration (1 year compared with at start)	17.5	*	*
Full-time duration (2 years compared with at start)	38.1	*	*
Full-time duration (3 years compared with at start)	62.3	*	*
Part-time duration (1 year compared with at start)	*	*	12.2
Part-time duration (2 years compared with at start)	*	*	26.0
Part-time duration (3 years compared with at start)	*	*	41.4
Age at commencement (20 years old compared with 16)	35.2	44.4	37.3
Age at commencement (25 years old compared with 16)	97.0	128.6	103.9
Age at commencement (30 years old compared with 16)	187.0	261.9	202.9
Characteristic dummy variables:			
Male	*	-	-
Part-time	*	-34.0	-40.3
Existing worker	21.6	*	22.7
High-level qualification	*	19.1	*
Completed Year 12	*	7.0	16.2
Had cert. III or above post-school qual.	*	16.5	18.2
School-based	-62.8	-37.6	-49.2
Private sector	13.3	*	*
Occupational dummy variables:			
Trades:			
31 Engineering, ICT and science technicians	17.5	-	-
32 Automotive and engineering	23.0	-	-
33 Construction trades workers	18.6	-	-
34 Electrotechnology and telecommunications trades workers	22.8	-	-
35 Food trades workers	14.3	-	-
391 Hairdressers	-9.4	-	-
All other trade occupations	--	-	-
Non-trades:			
1+2 Managers and professionals	-	--	-
4 Community and personal service workers	-	-10.9	-
5 Clerical and administrative workers	-	-2.3	-
6 Sales workers	-	-2.4	-
7 Machinery operators and drivers	-	13.1	-
8 Labourers	-	-3.9	-

Notes: Calculations derived according to the following example. If $\ln(w^1)$ is the wage when, say, the school-based dummy variable equals 1, and $\ln(w^2)$ is the reference wage (when the school-based dummy variable equals 0), then the percentage change in wages is given by $\%\Delta w=(\exp(\alpha)-1)*100$, where α is the coefficient on the school-based dummy variable from the reduced models.

* Denotes coefficient not significant at the 10% confidence level.

\- Denotes variable not entered into model.

-- Denotes occupational variable used as reference, and hence not entered into model.

Wages in alternative employment

In addition to the wage in the last week of the training contract, respondents to the Apprentice and Trainee Destination Survey also provide the wage they were receiving in September 2008, or approximately nine months after they had left the apprenticeship and traineeship system. We model this wage for those apprentices or trainees who did not complete to obtain the expected wage in alternative employment, at each point in the training contract. The model is restricted to those in employment—we are concentrating on wages rather than on the probability of gaining employment.

Our models here are identical to before (table 8). Wages in alternative employment increase as trade apprentices get further into their training contracts, whereas in the non-trades, only part-time duration for females is significant. Wages in alternative employment increase with age on commencement across the board. Male and existing worker trade apprentices who quit and find alternative employment also receive significantly higher wages. Looking at the non-trades, doing a traineeship part-time decreases wages in alternative employment, while trainees who completed Year 12 prior to commencement do better than those without this prior education.

There is little variation by occupation for the trades and non-trade males. The only group for which we retain the occupational dummies is non-trade females, and we see that those undertaking a traineeship in the labourer occupations receive significantly higher wages in alternative employment compared with other trainees, suggesting that wages for 'labourer' trainees are particularly low.

We again present the results more intuitively by converting the coefficients to show the percentage differences, relative to a reference category, in actual wages in alternative employment. Table 9 shows that wages in alternative employment are 49.2% higher for trade apprentices who withdraw after three years (compared with trade apprentices who notionally withdraw at the start). Once again age at commencement has a very significant impact on wages, but more interesting are the differences across the three groups. The increases in wages in alternative employment associated with starting an apprenticeship or traineeship later in life are much greater for non-trade males than the other groups. The table also quantifies the likely outcome of doing a traineeship part-time rather than full-time, with wages in alternative employment lower by 33.5% for males and 30.1% for females. This no doubt reflects that many of those doing a part-time apprenticeship or traineeship continue in part-time employment after they leave the apprenticeship or traineeship. Wages for existing worker trade apprentices (who drop out from their contract of training) are a lot higher (42.0%) than those who were new entrants (that is, non-existing worker) trade apprentices. This may be explained by cases of existing workers in the trades beginning an apprenticeship, quitting the training contract, but staying with the same employer, and on a comparatively high wage.

Table 8 Summary of regression of (log) annual wage in alternative employment, trades and non-trades (male/female)—reduced model

	Trades		Non-trades (male)		Non-trades (female)	
	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
Intercept	9.3951	0.2664	8.7407	0.2444	8.8812	0.3702
Full-time duration (days)	0.0004	0.0001	*	*	*	*
Part-time duration (days)	*	*	*	*	0.0004	0.0002
Age at commencement	0.0539	0.0208	0.0989	0.0164	0.0595	0.0191
Age at commencement (squared)	-0.0009	0.0004	-0.0012	0.0002	-0.0007	0.0003
Characteristic dummy variables:						
Male	0.2291	0.0623	-	-	-	-
Part-time	*	*	-0.4074	0.0715	-0.3577	0.0917
Existing worker	0.3507	0.1012	0.1614	0.0770	*	*
High-level qualification	*	*	*	*	0.2794	0.0959
Completed Year 12	*	*	0.1414	0.0621	0.1512	0.0698
Had cert. III or above post-school qual.	*	*	*	*	*	*
School-based	*	*	*	*	-0.3719	0.1203
Private sector	*	*	*	*	*	*
Occupational dummy variables:						
Trades:						
31 Engineering, ICT and science technicians	-	-	-	-	-	-
32 Automotive and engineering	-	-	-	-	-	-
33 Construction trades workers	-	-	-	-	-	-
34 Electrotechnology and telecommunications trades workers	-	-	-	-	-	-
35 Food trades workers	-	-	-	-	-	-
391 Hairdressers	-	-	-	-	-	-
All other trade occupations	-	-	-	-	-	-
Non-trades:						
1+2 Managers and professionals	-	-	-	-	--	
4 Community and personal service workers	-	-	-	-	0.1241	0.2136
5 Clerical and administrative workers	-	-	-	-	0.2482	0.2171
6 Sales workers	-	-	-	-	0.3361	0.2189
7 Machinery operators and drivers	-	-	-	-	0.0912	0.2987
8 Labourers	-	-	-	-	0.6243	0.2810
R-square	0.152		0.457		0.290	

Notes: * Denotes coefficient not significant at the 10% confidence level.

- Denotes variable not entered into model.

-- Denotes occupational variable used as reference, and hence not entered into model.

Appendix table B2 presents the models in greater detail.

Table 9 Impact of characteristics on annual wage in alternative employment, trades and non-trades (male/female), relative to a reference category

	Trades	Non-trades (male)	Non-trades (female)
	%	%	%
Full-time duration (1 year compared with at start)	14.3	*	*
Full-time duration (2 years compared with at start)	30.5	*	*
Full-time duration (3 years compared with at start)	49.2	*	*
Part-time duration (1 year compared with at start)	*	*	16.0
Part-time duration (2 years compared with at start)	*	*	34.5
Part-time duration (3 years compared with at start)	*	*	56.0
Age at commencement (20 years old compared with 16)	24.0	48.5	26.9
Age at commencement (25 years old compared with 16)	62.4	143.6	70.9
Age at commencement (30 years old compared with 16)	112.6	299.5	130.1
Characteristic dummy variables:			
Male	25.7	-	-
Part-time	*	-33.5	-30.1
Existing worker	42.0	17.5	*
High-level qualification	*	*	32.2
Completed Year 12	*	15.2	16.3
Had cert. III or above post-school qual.	*	*	*
School-based	*	*	-31.1
Private sector	*	*	*
Occupational dummy variables:			
Trades:			
31 Engineering, ICT and science technicians	-	-	-
32 Automotive and engineering	-	-	-
33 Construction trades workers	-	-	-
34 Electrotechnology and telecommunications trades workers	-	-	-
35 Food trades workers	-	-	-
391 Hairdressers	-	-	-
All other trade occupations	-	-	-
Non-trades:			
1+2 Managers and professionals	-	-	--
4 Community and personal service workers	-	-	13.2
5 Clerical and administrative workers	-	-	28.2
6 Sales workers	-	-	40.0
7 Machinery operators and drivers	-	-	9.5
8 Labourers	-	-	86.7

Notes: Calculations derived according to the following example. If $\ln(w^1)$ is the wage when, say, the school-based dummy variable equals 1, and $\ln(w^2)$ is the reference wage (when the school-based dummy variable equals 0), then the percentage change in wages is given by $\%\Delta w=(\exp(\alpha)-1)*100$, where α is the coefficient on the school-based dummy variable from the reduced models.

* Denotes coefficient not significant at the 10% confidence level.

\- Denotes variable not entered into model.

-- Denotes occupational variable used as reference, and hence not entered into model.

Wages on completion

The final wage we estimate is that which apprentices and trainees could expect on completion of their contract of training. We model the same wage after training variable as before but now we restrict the sample to those who completed their apprenticeship or traineeship. As with the previous model, we restrict the sample to those who are in employment.

The models here are tweaked slightly. Duration is not entered into the models because it does not make intuitive sense for wages on completion to change with the duration of the training contract. For example, the vast majority of qualifications in the trades (the group where wages are most sensitive to duration) are at the certificate III level. Whether the training contract is completed in a shorter or longer time frame than the traditional four years should not matter to wages on completion because the level of the qualification is the same: a certificate III in a particular trade. Any variation in wages on completion across qualification level should be captured by the dummy variable 'high level qualification', which compares certificate IV or diploma holders with those with a certificate II or III. Table 10 shows the final models.

In the trades, wages on completion increase with age on commencement and decrease for part-time and school-based apprentices. The significance of the part-time variable is quite remarkable, considering how few part-time trade apprentices there are (only 7% in the trades sample). In the non-trades, most of the characteristic dummy variables are significant. And again we see similar patterns as before, with the part-time and school-based variables having a negative effect and the prior education variables having a positive effect.

By occupation, trade apprentices in automotive, construction, and electrotechnology receive significantly higher wages on completion than the reference category, while hairdressers receive significantly less. Looking at the non-trades, males in community and personal services, and sales, receive significantly higher wages than managers and professionals. For non-trade females, none of the occupations is significantly different from the reference category.

Finally, table 11 quantifies the wages on completion for all the significant variables in percentage terms, relative to a reference category. The variation in wages across occupations is quite substantial, particularly for the trades. Compared with the reference category of 'all other trade occupations', wages on completion are 43.6% higher for apprentices in the electrotechnology and telecommunications trades, and 25.9% lower for hairdressers. The magnitude of the penalty for doing a school-based apprenticeship or traineeship is pretty constant across the three groups, with wages on completion around 30% lower than those that are not school-based. Part-time apprentices and trainees also earn less on completion, of between 21.0% (non-trade males) and 38.1% (trades), no doubt reflecting that many of those who complete continue in part-time employment.

Table 10 Summary of regression of (log) annual wage on completion, trades and non-trades (male/female)—reduced model

	Trades		Non-trades (male)		Non-trades (female)	
	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
Intercept	9.7831	0.2239	9.7525	0.1698	9.1987	0.2103
Full-time duration (days)	-	-	-	-	-	-
Part-time duration (days)	-	-	-	-	-	-
Age at commencement	0.0628	0.0170	0.0565	0.0088	0.0681	0.0108
Age at commencement (squared)	-0.0010	0.0003	-0.0006	0.0001	-0.0009	0.0002
Characteristic dummy variables:						
Male	*	*	-	-	-	-
Part-time	-0.4803	0.1160	-0.2357	0.0563	-0.2817	0.0471
Existing worker	*	*	0.0932	0.0440	0.1861	0.0494
High-level qualification	*	*	0.1152	0.0542	*	*
Completed Year 12	*	*	0.0748	0.0362	0.0977	0.0434
Had cert. III or above post-school qual.	*	*	0.1371	0.0415	0.1292	0.0551
School-based	-0.3635	0.1534	-0.3871	0.0774	-0.3723	0.0784
Private sector	*	*	-0.1739	0.0436	*	*
Occupational dummy variables:						
Trades:						
31 Engineering, ICT and science technicians	-0.0988	0.1079	-	-	-	-
32 Automotive and engineering	0.2060	0.0682	-	-	-	-
33 Construction trades workers	0.2725	0.0631	-	-	-	-
34 Electrotechnology and telecommunications trades workers	0.3621	0.0710	-	-	-	-
35 Food trades workers	-0.0459	0.0713	-	-	-	-
391 Hairdressers	-0.2996	0.0773	-	-	-	-
All other trade occupations	--		-	-	-	-
Non-trades:						
1+2 Managers and professionals	-	-	--		--	
4 Community and personal service workers	-	-	-0.2412	0.1003	0.0138	0.1205
5 Clerical and administrative workers	-	-	-0.0677	0.0939	0.0939	0.1208
6 Sales workers	-	-	-0.3299	0.1043	-0.1477	0.1241
7 Machinery operators and drivers	-	-	-0.0900	0.0980	-0.0597	0.1583
8 Labourers	-	-	-0.0893	0.1018	-0.0905	0.1325
R-square	0.462		0.540		0.384	

Notes: * Denotes coefficient not significant at the 10% confidence level.
- Denotes variable not entered into model.
-- Denotes occupational variable used as reference, and hence not entered into model.
Appendix table B3 presents the models in greater detail.

Table 11 Impact of characteristics on annual wage on completion, trades and non-trades (male/female), relative to a reference category

	Trades	Non-trades (male)	Non-trades (female)
	%	%	%
Age at commencement (20 years old compared with 16)	28.6	25.3	31.3
Age at commencement (25 years old compared with 16)	76.0	66.2	84.5
Age at commencement (30 years old compared with 16)	141.0	120.5	159.4
Characteristic dummy variables:			
Male	*	-	-
Part-time	-38.1	-21.0	-24.6
Existing worker	*	9.8	20.5
High-level qualification	*	12.2	*
Completed Year 12	*	7.8	10.3
Had cert. III or above post-school qual.	*	14.7	13.8
School-based	-30.5	-32.1	-31.1
Private sector	*	-16.0	*
Occupational dummy variables:			
Trades:			
31 Engineering, ICT and science technicians	-9.4	-	-
32 Automotive and engineering	22.9	-	-
33 Construction trades workers	31.3	-	-
34 Electrotechnology and telecommunications trades workers	43.6	-	-
35 Food trades workers	-4.5	-	-
391 Hairdressers	-25.9	-	-
All other trade occupations	--	-	-
Non-trades:			
1+2 Managers and professionals	-	--	--
4 Community and personal service workers	-	-21.4	1.4
5 Clerical and administrative workers	-	-6.5	9.8
6 Sales workers	-	-28.1	-13.7
7 Machinery operators and drivers	-	-8.6	-5.8
8 Labourers	-	-8.5	-8.7

Notes: Calculations derived according to the following example. If $\ln(w^1)$ is the wage when, say, the school-based dummy variable equals 1, and $\ln(w^2)$ is the reference wage (when the school-based dummy variable equals 0), then the percentage change in wages is given by $\%\Delta w=(\exp(\alpha)-1)*100$, where α is the coefficient on the school-based dummy variable from the reduced models.

* Denotes coefficient not significant at the 10% confidence level.

- Denotes variable not entered into model.

-- Denotes occupational variable used as reference, and hence not entered into model.

Impact of wages on completion

As argued at the outset, we believe that wages might matter rather more than what the elicited reasons for non-completion suggest. The basic hypothesis is that the higher the wage in an apprenticeship or traineeship compared with the alternative, and the higher the wage at completion compared with the alternative at completion, then the higher should be the completion rate. We label the difference between the wage in alternative employment and the training wage, and the difference between the wage on completion and the wage in alternative employment, as 'wage wedges'.

We know that wages, both in an apprenticeship or traineeship or in alternative employment, vary across the duration of the contract of training, for some groups. This is quite difficult to model because, for those groups where wages vary across duration, for example, the trades, the size of the wage wedges depend on the point that the apprentice or trainee is at (whether they are just beginning or whether they are near completion).

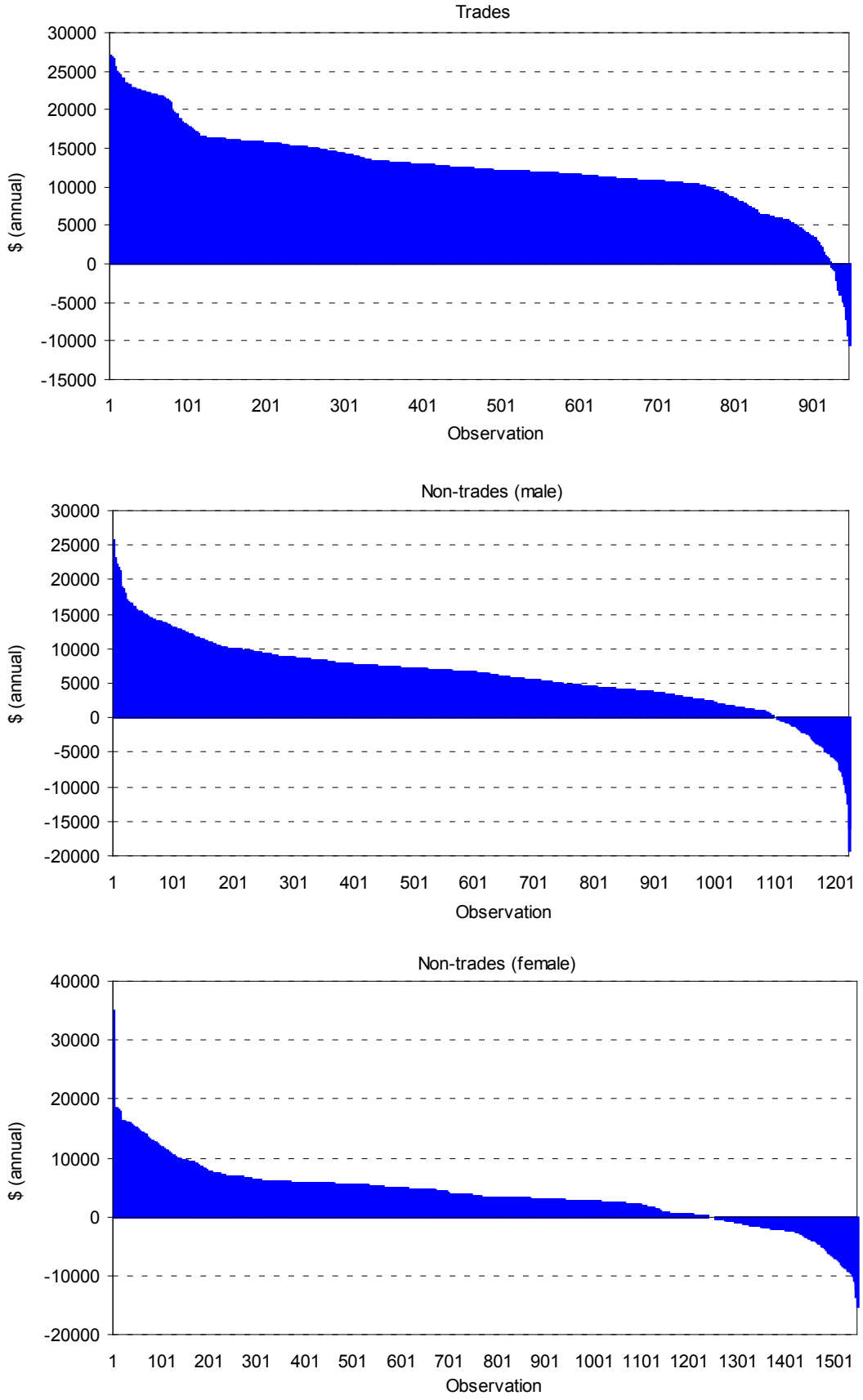
To make the modelling tractable for these groups, we abstract from this complexity and assume that it is the average wage wedge for the remainder of the contract that affects the probability of completing the contract. The average wages are relatively easy to calculate because of the functional form of the wage equations (see appendix C).

For the groups where wages do not vary across the duration of the training contract (non-trade males is one), the calculation of the wage wedges is relatively straightforward, in that we can simply use the predicted values of wages from the models.

Before presenting the completion and attrition models, it is useful to look at the wage wedges themselves.[7] Figure 1 plots the wedge between expected wages in alternative employment and wages during training for each apprentice or trainee in our groups. The figure shows that for the vast majority of apprentices and trainees the wedge is positive, meaning that for most the expected wage in alternative employment is higher than the wage during training. (The average wedge in the trades is $12 408 per annum, while in the non-trades it is $6010 for males and $3584 for females.)

[7] These wedges ignore any income support the apprentice or trainee would get because of being an apprentice or trainee. Some do receive supplementation through the youth allowance, but the number is too small to be material. As at December 2007 (corresponding to the sample frame for the Apprentice and Trainee Destination Survey) the number receiving the youth allowance was around 4000 or 1.6% of apprentices and trainees.

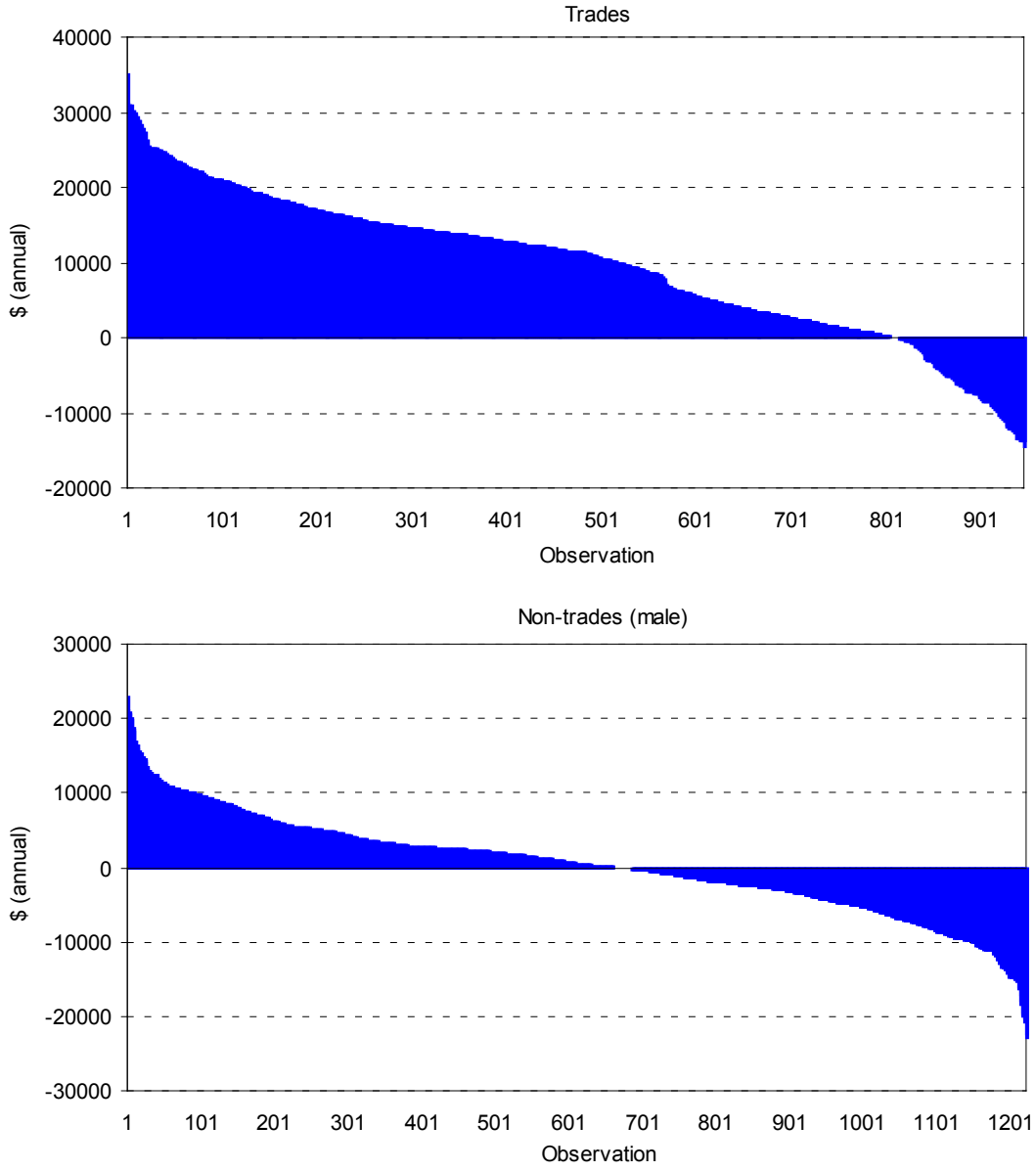
Figure 1 Wedge between expected wage in alternative employment and wage during training, trades and non-trades (male/female)



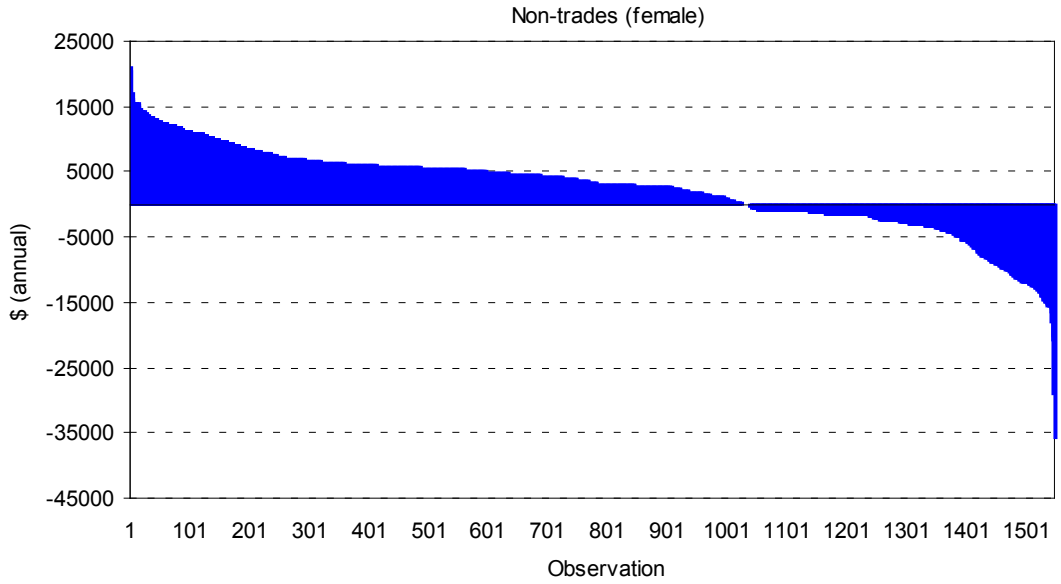
Note: A positive wedge implies that expected wages in alternative employment are greater than wages during training.

Thus most apprentices and trainees are truly receiving 'training wages', with the presumption that completion will pay off and result in higher wages than otherwise would have been the case.[8] We now look at the second of our the wedges: the wedge between expected wages on completion and expected wages in alternative employment, for every apprentice or trainee in our groups (figure 2).

Figure 2 Wedge between expected wage on completion and expected wage in alternative employment, trades and non-trades (male/female)



[8] Appendix table D1 tabulates the difference between the wage in alternative employment and the training wage for each of our occupational groups. Table D2 presents the number of observations for each of the groups.



Note: A positive wedge implies that expected wages on completion are greater than expected wages in alternative employment.

It is interesting just how much the picture varies across the three groups. In the trades the wedge is positive for the vast majority. By contrast, expected wages in alternative employment exceed expected wages on completion for nearly half of all non-trade males. In fact, the average wedge for this group is a mere $283 per annum (compared with $9449 for the trades). The picture is a bit more positive for non-trade females, with around two-thirds having a positive wedge. (The average wedge for females is $2347 per annum.)

Having examined the wage wedges, we now turn our attention to modelling the impact of wages on the probability of completing an apprenticeship or traineeship. The models contain only two explanatory variables: the wedge between expected wages in alternative employment and wages during training, and the wedge between expected wages on completion and expected wages in alternative employment. We hypothesise that the probability of completing a contract of training will be negatively related to the former and positively related to the latter. Thus we use one-tail tests for significance.

Table 12 shows that, overall, the wage wedges have a limited impact on the probability of completing an apprenticeship or traineeship.[9] In the trades model, the wedge between expected wages on completion and expected wages in alternative employment is significant. In the non-trades models, the wedge between expected wages in alternative employment and wages during training for males is significant.

[9] We have included the whole cohort in the regression model for simplicity. This includes the relatively small number of job leavers whose reason for leaving is job loss. For these individuals the job loss might be indirectly related to wages. For example, an employee is more likely to shirk if they are unhappy with the wage being received and therefore may lose their job. There would be some who have lost their job for other reasons (such as the firm closing), but the inclusion of these should have little effect.

Table 12 Summary of regression of probability of completing an apprenticeship or traineeship, trades and non-trades (male/female)

	Expected sign	Trades		Non-trades (male)		Non-trades (female)	
		Estimate	Chi-square	Estimate	Chi-square	Estimate	Chi-square
Intercept		-0.4791	76.581	0.8051	907.830	0.7366	447.624
Wedge between expected wages in alternative employment and wages during training	-	$2.90*10^{-5}$	73.632	**$-8.69*10^{-6}$**	5.483	$-2.26*10^{-7}$	0.002
Wedge between expected wages on completion and expected wages in alternative employment	+	**$1.00*10^{-5}$**	31.900	$-3.65*10^{-6}$	1.448	$2.68*10^{-6}$	0.301

Notes: Bolded figures are significant at the 10% confidence level based on a one-tail test.
Critical value for a chi-square test for significance at the 10% confidence level is 2.706 (1 degree of freedom).
Appendix table B4 presents the models in greater detail.

The statistically significant effects, however, are of some substance. In the former case, the 10th and 90th percentile wedges for the trades are -$3874 and $21 052, respectively. The difference between these translates to a difference of six percentage points in the probability of completion for a trade apprentice. Similarly, in the latter case the 10th and 90th percentile wedges for non-trade males are $37 and $12 280, respectively. This translates to a difference of two percentage points in the probability of completion for non-trade male trainees.

Thus we have some evidence that wages matter but it is not consistent over the three groups.

The models presented above look at completion at the outset of the contract. We can also look at the probability of completing at various points into the contract by conditioning on those who have not yet dropped out. The models are confined to the trades because this was the group where the duration of the training contract had the most impact on wages, both during the apprenticeship and in alternative employment.

For convenience we reparameterise the model to consider the probability of not completing the apprenticeship. The models are run on ever-decreasing sample sizes. That is, in the model considering non-completion after six months, those trade apprentices who either quit or completed in the first six months are excluded from the sample. In the model considering non-completion after the first year, those apprentices who either quit or completed in the first year are excluded, and so on. Also, our proxies for the signs on the two wages wedges change. We now expect the probability of leaving a trade apprenticeship to be positively associated with the wedge between expected wages in alternative employment and wages during training, and to be negatively associated with the wedge between expected wages on completion and expected wages in alternative employment.

Table 13 Summary of regression of probability of leaving a trade apprenticeship, conditional on remaining a trade apprentice at 6, 12, 18 and 24 months into the contract, respectively

	Expected sign	Estimate	Chi-square
Having been an apprentice for 6 months			
Intercept		-0.3147	23.816
Wedge between expected wages in alternative employment and wages during training	+	$-2.34*10^{-6}$	0.351
Wedge between expected wages on completion and expected wages in alternative employment	-	**$-3.53*10^{-6}$**	2.934
Sample size = 734			
Having been an apprentice for 12 months			
Intercept		-0.8665	129.969
Wedge between expected wages in alternative employment and wages during training	+	$7.33*10^{-7}$	0.024
Wedge between expected wages on completion and expected wages in alternative employment	-	$5.50*10^{-6}$	4.852
Sample size = 546			
Having been an apprentice for 18 months			
Intercept		-1.1762	148.358
Wedge between expected wages in alternative employment and wages during training	+	$4.62*10^{-7}$	0.006
Wedge between expected wages on completion and expected wages in alternative employment	-	$5.85*10^{-6}$	3.337
Sample size = 448			
Having been an apprentice for 24 months			
Intercept		-0.7674	37.538
Wedge between expected wages in alternative employment and wages during training	+	$-5.00*10^{-5}$	42.154
Wedge between expected wages on completion and expected wages in alternative employment	-	$-9.00*10^{-7}$	0.042
Sample size = 334			

Notes: Bolded figures are significant at the 10% confidence level based on a one-tail test.
Critical value for a chi-square test for significance at the 10% confidence level is 2.706 (1 degree of freedom).
Appendix table B5 presents the models in greater detail.

The first of these models provides results consistent with earlier analyses. The size of the wedge between wages on completion and wages in alternative employment is significant. However, the subsequent models further into the contract of training provide no statistically significant relationships. This suggests that the wage obtained on completion is a factor for the apprentices at the beginning—the first 12 months—of an apprenticeship, but not thereafter.

The value of completion

The models we have set up to test whether wages affect completion rates also allow us to estimate the value of completing an apprenticeship or traineeship, at least in a limited sense. By looking at the difference between wage on completion and wage in alternative employment (that is, the wage of those who do not complete), we have a direct estimate of the short-term value of completion. It should be noted that these figures relate to approximately nine months after training (whether completed or not). The full value of completion is really beyond us because it would involve estimating future income streams, and it is likely that income growth, as individuals get more experience, will differ between occupations. Estimating such income growth is not possible with the data source we are working with.

Nevertheless, we can calculate the short-term value of completing a qualification by predicting for each individual the wage on completion and the wage in alternative employment. We have already presented the overall distribution of these predictions in figure 2, where we saw that the great majority of apprentices (that is, in the trades) gain a considerable wage premium on completion, but that a lesser proportion pertained for trainees.

In table 14, we provide an additional tabulation. For seven trade occupations and six non-trades occupations we tabulate the mean wage premium on completion (expressed in full-year terms), with the latter occupations split further by males and females. We also provide the proportion of the sample for whom there is a positive wage premium. The idea is to get an estimate of the value of completing an apprenticeship or traineeship, by occupation.

Two of the structural features of the current apprenticeship and traineeship system are that contracts of training are permitted for existing workers and part-time workers. As seen earlier, the importance of these groups differs substantially across occupations. Our models have incorporated these two characteristics and used them in the prediction of wages and the calculation of the wedges. This is appropriate because it reflects the appropriate alternatives to the completion of an apprenticeship or traineeship. However, one could argue that these variables muddy the calculation of the value of completion. This is especially obvious for part-time apprentices and trainees who may well go to full-time employment once they exit the apprenticeship or traineeship. Similarly, existing workers who complete their contract of training may not get a pay rise if they remain with that employer. To abstract from this issue, we do the calculations of the wage premium only for those apprentices and trainees who are full-time and are not existing workers.

Table 14 Mean, and proportion above zero, of wage premium on completion of an apprenticeship or traineeship, trades and non-trades (male/female)—excluding part-timers and existing workers

		Trades		Non-trades (male)		Non-trades (female)	
		Mean ($)	% above zero	Mean ($)	% above zero	Mean ($)	% above zero
Trades:							
31	Engineering, ICT and science technicians	6 329.1	100.0	-	-	-	-
32	Automotive and engineering	13 724.4	100.0	-	-	-	-
33	Construction trades workers	16 867.8	100.0	-	-	-	-
34	Electrotechnology and telecommunications trades workers	23 232.1	100.0	-	-	-	-
35	Food trades workers	6 228.8	94.5	-	-	-	-
391	Hairdressers	631.7	73.4	-	-	-	-
All other trade occupations		6 158.7	100.0	-	-	-	-
Total		12 105.0	96.4	-	-	-	-
Non-trades:							
1+2	Managers and professionals	-	-	7 937.6	91.7	5 363.9	93.3
4	Community and personal service workers	-	-	-832.7	46.4	6 428.1	92.7
5	Clerical and administrative workers	-	-	4 911.2	82.9	6 007.1	95.9
6	Sales workers	-	-	-5 088.3	8.6	-4 426.5	6.5
7	Machinery operators and drivers	-	-	1 319.0	54.6	6 452.7	100.0
8	Labourers	-	-	2 551.9	70.2	-12 667.2	0.0
Total		-	-	1 624.1	59.8	2 403.9	68.2

For the trades, the wage premiums are quite handsome, except for hairdressers. Of the other trade occupations, premiums range from around $6000 for food and 'all other ' trades up to $23 000 for electrotechnology and telecommunications.

Among the non-trade occupations the picture is rather mixed. No occupation group commands the same sort of premium as the trade occupations with the highest premium. Both males and females who complete manager and professional traineeships command a healthy premium, as do clerical and administrative workers, machinery operators and drivers, and females in community and personal service workers.

What stands out from the table is the number of the non-trades occupations for which there is a negative premium attached to completion. This means that those who complete on average get paid less than those who do not complete, at least at nine months after training. Occupations in this category are sales (both males and females), community and personal service workers (males), and labourers (females). These negative premiums suggest that there is a range of traineeships for which there is apparently little skills acquisition during the traineeship, or if there is skills acquisition the skills are not valued by the labour market over the general work experience obtained during the traineeship.

The major point to emerge is that apprenticeships and traineeships are a bit of a mixed bag. The theoretical model in which individuals invest in their skills development by taking a training wage in order to reap the rewards of their investment through a wage premium on completion is certainly the case for some apprenticeships and traineeships. But it is not the case for all, and therefore the value of the training must be questioned for those occupations.

Discussion

The primary focus of this paper was on the impact of wages on the decision not to continue with an apprenticeship or traineeship. We were sceptical of simple tabulations of the data suggesting wages were a relatively unimportant factor and so we resolved to conduct a more thorough analysis. We began by modelling three wages relevant to apprentices and trainees: the wage during training; the expected wage in alternative employment; and, the expected wage on completion. The results of these models were then used as inputs into a model that estimated the impact of wages, or rather differences between them, on the probability of withdrawal and the final probability of completion. Apprentices and trainees were divided into three groups: trades, non-trades (male), and non-trades (female) to reflect the diverse structure of the labour market.

Overall, our conclusion is that wages do have some impact on the decision not to continue with an apprenticeship or traineeship but the effect is not consistent across the three groups. Specifically, the difference between wages on completion and wages in alternative employment is significant in the trades, and the difference between wages during training and wages in alternative employment is significant for males in non-trade traineeships. For females in traineeships we found no significant relationships between wages and completion rates. In the trades, we also found that the relationship disappeared with the duration of the contract, with its being significant at the beginning of the contract, and after six months, but not after 12 months.

What this means is that, at least on this evidence, increasing training wages would have little effect on completion rates. For apprentices, it is the premium associated with becoming a tradesperson that counts, not training wages. For females in non-trade traineeships we find no relationship between wages and completion rates. It is only relevant for males in non-trade traineeships for which increasing training wages would make a difference to completion rates. But there is a quandary here because for this group there is, on average, only a modest premium to completion, and therefore arguably we are least concerned about completion here. The training job on this interpretation is just like any other job and does not provide any out-of-the-ordinary skills acquisition.

It seems that the low completion rates we observe need to be attributed to other factors, although wages play some role. These other factors include: unhappiness with the training or work of the apprenticeship or traineeship; poor working relationships with bosses or workmates; personal reasons such as illness or having moved residence; or quite simply redundancy, which in a climate of economic downturn would be a more important factor.

In understanding these results we need to remember that individuals entering an apprenticeship or traineeship will have some knowledge of likely wage rates in the apprenticeship or traineeship and elsewhere. It is also likely to be the case that an increase in wages in an apprenticeship or traineeship is likely to increase their attractiveness, and thus could well increase the number of commencements (although this depends on the extent to which the numbers of apprentice and trainee positions are constrained by the willingness of employers to offer them).

Thus our findings generally support the school of thought that emphasises non-training wage factors as being key to improving completion rates. Wages must matter, because individuals do have alternatives to undertaking or completing a contract of training (and we know that levels of

satisfaction with wages are not high), but once an apprenticeship or traineeship has been commenced, then a whole lot of factors enter the equation.

While the training wage does not affect completions for apprenticeships and for females in traineeships, our findings do bear on the whole concept of a training wage. The logic is that individuals invest in their own training by taking a low wage early on in the apprenticeship or traineeship, with the expectation that the investment is recouped by a wage premium on completion. This model seems very apposite for trades such as electrotechnology and telecommunications, construction and automotive and engineering, but less so for other occupations for which the premium is less handsome or negative. If the training wage is not seen as an investment, then the whole notion of a training wage becomes problematic. (See Bittman et al. 2007 for a fuller discussion of training wages for apprentices.)

One final comment relates to the title of the paper. Originally, we had thought about calling it *The value of completing an apprenticeship or traineeship*. In the end we decided on a rather more prosaic title, *The impact of wages on the probability of completing an apprenticeship or traineeship*. One of the most interesting parts of the exercise, however, has been the derivation of the wedge between the wage on completion and the wage in alternative employment. This does go to the issue of the value of the apprenticeship or traineeship, in the sense that if apprenticeships and traineeships are about training and increased skill levels, then we would expect to see that wages on completion would be higher than wages in an alternative job. For apprenticeships the results are as expected, with a clear pay-off to completing most apprenticeships. However, the results are not so clear cut for traineeships. Some traineeships have a clear premium attached to their completion, others do not. This finding raises obvious questions about the value of some traineeships in terms of increasing skills levels. On this point, it is worth recalling that the original conception of traineeships was as a mechanism for getting disadvantaged young people into employment rather than as an investment in training.

References

Australian Chamber of Commerce and Industry (ACCI) 2005, 'Paying apprentices: The market responds', *ACCI Review*, no.120, pp.5–9.

Bessey, D & Backes-Gellner, U 2007, *Premature apprenticeship terminations: An economic analysis*, University of Zurich, Institute for Strategy and Business Economics (ISU) and Swiss Leading House Economics of Education, Firm Behaviour and Training Policies, viewed June 2010, <http://econpapers.repec.org/paper/isoeducat/0002.htm>.

——2008, *Dropping out and revising educational decisions: Evidence from vocational education*, Leading House working paper no.40, Swiss Leading House on Economics of Education Firm Behaviour and Training Policies, viewed July 2010, <http://econpapers.repec.org/paper/isoeducat/0040.htm>.

Bittman, M, Reavell, R, Smith, G & Battin, T 2007, *Living standards of apprentices*, a report prepared for Group Training Australia by the Centre of Applied Research in Social Science, University of New England, Armidale, NSW.

Cobb-Clark, D, Frijters, P & Kalb, G 2004, *Do you need a job to find a job?*, Institute for the Study of Labour (IZA) discussion paper no. 1211, viewed June 2010, <http://ssrn.com/abstract=560814>.

Cully, M & Curtain, R 2001, *Reasons for new apprentices' non-completions*, NCVER, Adelaide.

Fullager, M & Tonkin, B 2008, *Surviving the first two years of an apprenticeship: An analysis of the 2007 apprentice survey reports produced by the Australian Bureau of Statistics*, DFEEST, Adelaide, viewed June 2010, <http://www.employment.sa.gov.au/employ/files/links/Surviving_the_First_Two_Ye.pdf>.

Gallacher, J, Whittaker, S, Crossan, B & Mills, V 2004, *Modern apprenticeships: Improving completion rates*, Scottish Executive Social Research, Dept of Enterprise, Transport and Lifelong Learning, Glasgow, UK, viewed December 2008, <http://www.scotland.gov.uk/Resource/Doc/47171/0028784.pdf>.

Huntly Consulting Group 2008, *Exits from the trades: final report—Research into attrition from the trades*, DEEWR, Canberra, viewed October 2008, <http://www.dest.gov.au/sectors/training_skills/publications_resources/profiles/exits_from_the_trades_final_report.htm>.

Karmel, T & Misko J 2009, *Apprenticeships and traineeships in the downturn*, NCVER, Adelaide.

Mitchell, J, Dobbs, G & Ward, J 2008, *A systematic approach to retaining apprentices*, Department of Employment and Workplace Relations (DEEWR), Canberra.

Misko, J, Nguyen, N & Saunders, J 2007, *Doing an apprenticeship: What young people think*, NCVER, Adelaide.

Nechvoglod, L, Karmel, T & Saunders, J 2009, *The cost of training apprentices*, NCVER, Adelaide.

Oliver, D 2008, *The link between industrial arrangements and skill reforms: Final report*, Workplace Research Centre, University of Sydney, viewed June 2010, <http://www.industrialrelations.nsw.gov.au/pdfs/oir_vet_final reportnov2008.pdf>.

NCVER (National Centre for Vocational Education Research) 2009a, *Australian vocational education and training: Apprentices and trainees, 2008—Annual*, NCVER, Adelaide.

——2009b, *Apprentice and trainee destinations, 2008*, NCVER, Adelaide.

Norris, K, Kelly, R & Giles, M 2005, *Economics of Australian Labour Markets*, 6th edn, Pearson Education Australia, Melbourne.

Pannenberg, M 2007, *Risk aversion and reservation wages*, Institute for the Study of Labour (IZA) discussion paper no.2806, viewed June 2010, <http://ssrn.com/abstract=994898>.

Rudd, M, Henderson, R, Usher, D & Hawtin, M 2008, *Rapid review of research on apprenticeships*, Learning and Skills Council, Coventry.

Snell, D & Hart, A 2008, 'Reasons for non-completion and dissatisfaction among apprentices and trainees: A regional case study', *International Journal of Training Research*, vol.6, no.1, 2008. pp.44–73.

Steedman, H 2008, 'Time to look again at apprentice pay? Getting cost sharing right', *SSDA Catalyst*, issue 5.

West, J 2005, *Improving completion rates in apprenticeships: A comparative and numerical approach*, Apprenticeships Task Force, Windsor.

Appendix A: Apprentice and Trainee Destination Survey

The Apprentice and Trainee Destination Survey provides information about the destinations of apprentices and trainees approximately nine months after they leave their training. The findings relate to apprentices and trainees who completed their training (completers) between October and December 2007, or who cancelled or withdrew from an apprenticeship or traineeship and did not return to finish (non-completers) during this period.

The statistical publication from the survey presents employment outcomes, reasons for non-completion, satisfaction with the apprenticeship or traineeship, and further study destinations. A number of supporting documents are also available, including additional data tables and technical notes. See Apprentice and trainee destination 2008.

Appendix B: Regressions models

Table B1 Regression of (log) annual wage during training, trades and non-trades (male/female)—reduced models

Trades					
Sample size	817				
Analysis of variance					
Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	12	2553.89	212.82	65.16	<.0001
Error	804	2625.91	3.27		
Corrected total	816	5179.80			
Root MSE	1.8072	R-square	0.4930		
Dependent mean	10.0859	Adj R-sq	0.4855		
Coeff var	17.9184				
Parameter estimates					
Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	8.4994	0.1651	51.49	<.0001	0.00
Full-time duration (days)	0.0004	0.0000	12.86	<.0001	1.15
Age at commencement	0.0753	0.0116	6.52	<.0001	27.09
Age at commencement (squared)	-0.0009	0.0002	-4.76	<.0001	26.79
Existing worker	0.1959	0.0605	3.24	0.0013	1.12
School-based	-0.9898	0.0812	-12.19	<.0001	1.26
Private sector	0.1249	0.0397	3.14	0.0017	1.04
31 Engineering, ICT and science technicians	0.1612	0.0950	1.70	0.0902	1.38
32 Automotive and engineering	0.2068	0.0552	3.75	0.0002	2.12
33 Construction trades workers	0.1710	0.0532	3.21	0.0014	2.40
34 Electrotechnology and telecommunications trades workers	0.2057	0.0630	3.27	0.0011	1.78
35 Food trades workers	0.1337	0.0589	2.27	0.0235	1.93
391 Hairdressers	-0.0983	0.0677	-1.45	0.1466	1.61

Non-trades (male)

Sample size	1019

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	12	6309.58	525.80	117.96	<.0001
Error	1006	4484.19	4.46		
Corrected total	1018	10794.00			

Root MSE	2.1113	R-square	0.5846		
Dependent mean	10.2735	Adj R-sq	0.5796		
Coeff var	20.5506				

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	8.6578	0.1598	54.18	<.0001	0
Age at commencement	0.0919	0.0084	10.99	<.0001	46.74
Age at commencement (squared)	-0.0010	0.0001	-8.97	<.0001	42.77
Part-time	-0.4158	0.0500	-8.31	<.0001	1.83
High-level qualification	0.1751	0.0519	3.37	0.0008	1.47
Completed Year 12	0.0674	0.0353	1.91	0.0562	1.13
Had cert. III or above post-school qual.	0.1531	0.0427	3.58	0.0004	1.11
School-based	-0.4716	0.0725	-6.51	<.0001	1.90
4 Community and personal service workers	-0.1157	0.0975	-1.19	0.2358	4.26
5 Clerical and administrative workers	-0.0236	0.0915	-0.26	0.7963	4.84
6 Sales workers	-0.0247	0.0992	-0.25	0.8036	4.28
7 Machinery operators and drivers	0.1230	0.0953	1.29	0.1967	7.02
8 Labourers	-0.0399	0.0970	-0.41	0.6808	5.64

Non-trades (female)

Sample size	1191

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	8	5938.93	742.37	165.93	<.0001
Error	1182	5288.08	4.47		
Corrected total	1190	11227.00			

Root MSE	2.1152	R-square	0.5290		
Dependent mean	9.8747	Adj R-sq	0.5258		
Coeff var	21.4198				

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	8.7251	0.1271	68.66	<.0001	0.00
Part-time duration (days)	0.0003	0.0001	3.51	0.0005	2.34
Age at commencement	0.0792	0.0084	9.45	<.0001	50.28
Age at commencement (squared)	-0.0010	0.0001	-8.28	<.0001	47.11
Part-time	-0.5156	0.0498	-10.36	<.0001	2.64
Existing worker	0.2049	0.0397	5.16	<.0001	1.35
Completed Year 12	0.1504	0.0346	4.35	<.0001	1.26
Had cert. III or above post-school qual.	0.1673	0.0430	3.89	0.0001	1.05
School-based	-0.6764	0.0615	-11.00	<.0001	1.78

Table B2 Regression of (log) annual wage in alternative employment, trades and non-trades (male/female)—reduced models

Trades

Sample size 367

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	5	222.51	44.50	12.94	<.0001
Error	361	1241.20	3.44		
Corrected total	366	1463.71			

Root MSE	1.8543	R-square	0.1520
Dependent mean	10.4297	Adj R-sq	0.1403
Coeff var	17.7786		

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	9.3951	0.2664	35.27	<.0001	0.00
Full-time duration (days)	0.0004	0.0001	4.91	<.0001	1.03
Age at commencement	0.0539	0.0208	2.59	0.0100	35.02
Age at commencement (squared)	-0.0009	0.0004	-2.45	0.0148	35.41
Male	0.2291	0.0623	3.68	0.0003	1.07
Existing worker	0.3507	0.1012	3.47	0.0006	1.02

Non-trades (male)

Sample size 320

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	5	1039.81	207.96	52.91	<.0001
Error	314	1234.07	3.93		
Corrected total	319	2273.88			

Root MSE	1.9825	R-square	0.4573
Dependent mean	10.3930	Adj R-sq	0.4486
Coeff var	19.0751		

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	8.7407	0.2444	35.77	<.0001	0.00
Age at commencement	0.0989	0.0164	6.03	<.0001	46.24
Age at commencement (squared)	-0.0012	0.0002	-4.87	<.0001	43.61
Part-time	-0.4074	0.0715	-5.70	<.0001	1.25
Existing worker	0.1614	0.0770	2.10	0.0369	1.33
Completed Year 12	0.1414	0.0621	2.28	0.0235	1.04

Non-trades (female)

Sample size	379

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	12	771.01	64.25	12.46	<.0001
Error	366	1887.59	5.16		
Corrected total	378	2658.60			

Root MSE	2.2710	R-square	0.2900
Dependent mean	10.0267	Adj R-sq	0.2667
Coeff var	22.6493		

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	8.8812	0.3702	23.99	<.0001	0.00
Part-time duration (days)	0.0004	0.0002	2.37	0.0183	1.79
Age at commencement	0.0595	0.0191	3.12	0.0019	49.91
Age at commencement (squared)	-0.0007	0.0003	-2.64	0.0085	47.38
Part-time	-0.3577	0.0917	-3.9	0.0001	2.20
High-level qualification	0.2794	0.0959	2.91	0.0038	1.38
Completed Year 12	0.1512	0.0698	2.17	0.0309	1.28
School-based	-0.3719	0.1203	-3.09	0.0021	1.56
4 Community and personal service workers	0.1241	0.2136	0.58	0.5618	9.17
5 Clerical and administrative workers	0.2482	0.2171	1.14	0.2537	10.88
6 Sales workers	0.3361	0.2189	1.54	0.1254	11.29
7 Machinery operators and drivers	0.0912	0.2987	0.31	0.7604	2.15
8 Labourers	0.6243	0.2810	2.22	0.0269	2.17

Table B3 Regression of (log) annual wage on completion, trades and non-trades (male/female)—reduced models

Trades

Sample size 407

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	10	800.14	80.01	33.95	<.0001
Error	396	933.26	2.36		
Corrected total	406	1733.40			

Root MSE	1.5352	R-square	0.4616
Dependent mean	10.7169	Adj R-sq	0.4480
Coeff var	14.3246		

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	9.7831	0.2239	43.70	<.0001	0.00
Age at commencement	0.0628	0.0170	3.71	0.0002	40.46
Age at commencement (squared)	-0.0010	0.0003	-3.19	0.0015	40.39
Part-time	-0.4803	0.1160	-4.14	<.0001	2.56
School-based	-0.3635	0.1534	-2.37	0.0183	2.61
31 Engineering, ICT and science technicians	-0.0988	0.1079	-0.92	0.3602	1.66
32 Automotive and engineering	0.2060	0.0682	3.02	0.0027	1.90
33 Construction trades workers	0.2725	0.0631	4.32	<.0001	2.32
34 Electrotechnology and telecommunications trades workers	0.3621	0.0710	5.10	<.0001	1.81
35 Food trades workers	-0.0459	0.0713	-0.64	0.5205	1.79
391 Hairdressers	-0.2996	0.0773	-3.88	0.0001	1.63

Non-trades (male)

Sample size	666

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	14	2463.76	175.98	54.56	<.0001
Error	651	2099.66	3.23		
Corrected total	665	4563.42			

Root MSE	1.7959	R-square	0.5399
Dependent mean	10.5392	Adj R-sq	0.5300
Coeff var	17.0404		

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	9.7525	0.1698	57.42	<.0001	0.00
Age at commencement	0.0565	0.0088	6.44	<.0001	51.34
Age at commencement (squared)	-0.0006	0.0001	-5.49	<.0001	45.22
Part-time	-0.2357	0.0563	-4.19	<.0001	2.13
Existing worker	0.0932	0.0440	2.12	0.0343	1.73
High-level qualification	0.1152	0.0542	2.13	0.0338	1.73
Completed Year 12	0.0748	0.0362	2.06	0.0394	1.19
Had cert. III or above post-school qual.	0.1371	0.0415	3.31	0.0010	1.13
School-based	-0.3871	0.0774	-5.00	<.0001	2.27
Private sector	-0.1739	0.0436	-3.99	<.0001	1.18
4 Community and personal service workers	-0.2412	0.1003	-2.40	0.0165	4.76
5 Clerical and administrative workers	-0.0677	0.0939	-0.72	0.4712	4.95
6 Sales workers	-0.3299	0.1043	-3.16	0.0016	3.95
7 Machinery operators and drivers	-0.0900	0.0980	-0.92	0.3590	7.91
8 Labourers	-0.0893	0.1018	-0.88	0.3808	5.58

Non-trades (female)

Sample size	810

Analysis of variance

Source	DF	Sum of squares	Mean square	F value	Pr > F
Model	12	2346.49	195.54	41.38	<.0001
Error	797	3765.96	4.73		
Corrected total	809	6112.46			

Root MSE	2.1738	R-square	0.3839
Dependent mean	10.1728	Adj R-sq	0.3746
Coeff var	21.3682		

Parameter estimates

Variable	Parameter estimate	Standard error	t value	Pr > |t|	Variance inflation
Intercept	9.1987	0.2103	43.74	<.0001	0.00
Age at commencement	0.0681	0.0108	6.29	<.0001	58.84
Age at commencement (squared)	-0.0009	0.0002	-5.99	<.0001	53.44
Part-time	-0.2817	0.0471	-5.99	<.0001	1.57
Existing worker	0.1861	0.0494	3.77	0.0002	1.52
Completed Year 12	0.0977	0.0434	2.25	0.0247	1.32
Had cert. III or above post-school qual	0.1292	0.0551	2.35	0.0192	1.10
School-based	-0.3723	0.0784	-4.75	<.0001	2.08
4 Community and personal service workers	0.0138	0.1205	0.11	0.9089	8.85
5 Clerical and administrative workers	0.0939	0.1208	0.78	0.4370	8.93
6 Sales workers	-0.1477	0.1241	-1.19	0.2344	7.48
7 Machinery operators and drivers	-0.0597	0.1583	-0.38	0.7063	2.29
8 Labourers	-0.0905	0.1325	-0.68	0.4947	4.14

Table B4 Regression of probability of completing an apprenticeship or traineeship, trades and non-trades (male/female)

Trades

Sample size	946

Response profile

Ordered value	Completed dummy	Total frequency	Total weight
1	0	486	8325
2	1	460	8138

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	22822.16	22747.93
SC	22827.01	22762.48
-2 Log L	22820.16	22741.93
R-Square	0.0794	

Analysis of maximum likelihood estimates

Variable	Parameter estimate	Standard error	Wald chi-square
Intercept	-0.4791	0.0547	76.5807
Wedge between expected wages in alternative employment and wages during training	$2.90*10^{-5}$	$3.36*10^{-6}$	73.6322
Wedge between expected wages on completion and expected wages in alternative employment	$1.00*10^{-5}$	$1.82*10^{-6}$	31.9001

Non-trades (male)

Sample size	1223

Response profile

Ordered value	Completed dummy	Total frequency	Total weight
1	0	453	6498
2	1	770	13806

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	25458.89	25457.16
SC	25464.00	25472.49
-2 Log L	25456.89	25451.16
R-Square	0.0047	

Analysis of maximum likelihood estimates

Variable	Parameter estimate	Standard error	Wald chi-square
Intercept	0.8051	0.0267	907.8298
Wedge between expected wages in alternative employment and wages during training	$-8.69*10^{-6}$	$3.71*10^{-6}$	5.4833
Wedge between expected wages on completion and expected wages in alternative employment	$-3.65*10^{-6}$	$3.03*10^{-6}$	1.4480

Non-trades (female)

Sample size	1549

Response profile

Ordered value	Completed dummy	Total frequency	Total weight
1	0	540	7956
2	1	1009	16713

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	31024.29	31026.62
SC	31029.63	31042.65
-2 Log L	31022.29	31020.62
R-Square	0.0011	

Analysis of maximum likelihood estimates

Variable	Parameter estimate	Standard error	Wald chi-square
Intercept	0.7366	0.0348	447.6244
Wedge between expected wages in alternative employment and wages during training	$-2.26*10^{-7}$	$5.92*10^{-6}$	0.0015
Wedge between expected wages on completion and expected wages in alternative employment	$2.68*10^{-6}$	$4.89*10^{-6}$	0.3010

Table B5 Regression of probability of leaving trade apprenticeship, conditional on remaining a trade apprentice at 6, 12, 18 and 24 months into the contract, respectively

Having been an apprentice for 6 months

Sample size	734		
Response profile			
Ordered value	Left after 6 months dummy	Total frequency	Total weight
1	0	437	7850
2	1	297	5394
Model fit statistics			
Criterion	Intercept only	Intercept and covariates	
AIC	17903.39	17904.33	
SC	17907.99	17918.13	
-2 Log L	17901.39	17898.33	
R-Square	0.0042		
Analysis of maximum likelihood estimates			
Variable	Parameter estimate	Standard error	Wald chi-square
Intercept	-0.3147	0.0645	23.8160
Wedge between expected wages in alternative employment and wages during training	$-2.34*10^{-6}$	$3.95*10^{-6}$	0.3512
Wedge between expected wages on completion and expected wages in alternative employment	$-3.53*10^{-6}$	$2.06*10^{-6}$	2.9338

Having been an apprentice for 12 months

Sample size	546

Response profile

Ordered value	Left after 1 year dummy	Total frequency	Total weight
1	0	392	7092
2	1	154	3148

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	12638.09	12636.09
SC	12642.40	12649.00
-2 Log L	12636.09	12630.09
R-Square	0.0109	

Analysis of maximum likelihood estimates

Variable	Parameter estimate	Standard error	Wald chi-square
Intercept	-0.8665	0.0760	129.9693
Wedge between expected wages in alternative employment and wages during training	$7.33*10^{-7}$	$4.72*10^{-6}$	0.0242
Wedge between expected wages on completion and expected wages in alternative employment	$5.50*10^{-6}$	$2.50*10^{-6}$	4.8520

Having been an apprentice for 18 months

Sample size	448

Response profile

Ordered value	Left after 18 months dummy	Total frequency	Total weight
1	0	343	6241
2	1	105	2014

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	9174.20	9173.76
SC	9178.31	9186.07
-2 Log L	9172.20	9167.76
R-Square	0.0099	

Analysis of maximum likelihood estimates

Variable	Parameter estimate	Standard error	Wald chi-square
Intercept	-1.1762	0.0966	148.3581
Wedge between expected wages in alternative employment and wages during training	$4.62*10^{-7}$	$5.97*10^{-6}$	0.0060
Wedge between expected wages on completion and expected wages in alternative employment	$5.85*10^{-6}$	$3.20*10^{-6}$	3.3368

Having been an apprentice for 24 months

Sample size	334

Response profile

Ordered value	Left after 2 years dummy	Total frequency	Total weight
1	0	276	4967
2	1	58	1145

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	5899.78	5849.57
SC	5903.59	5861.01
-2 Log L	5897.78	5843.57
R-Square	0.1498	

Analysis of maximum likelihood estimates

Variable	Parameter estimate	Standard error	Wald chi-square
Intercept	-0.7674	0.1253	37.5375
Wedge between expected wages in alternative employment and wages during training	$-5.00*10^{-5}$	$8.05*10^{-6}$	42.1538
Wedge between expected wages on completion and expected wages in alternative employment	$-9.00*10^{-7}$	$4.41*10^{-6}$	0.0417

Appendix C: Estimating average wages

Denote $w^A(t)$ as the wage the apprentice or trainee gets at point t in the training contract. At the beginning of the contract $t = 0$, at the end $t = D$ where D is the duration of a completed contract.

Then $\ln(w_i^A(t)) = X_i^1 \beta^A + \alpha^A t$, where i refers to the i^{th} apprentice, X_i^1 is a vector of characteristics, β^A is a vector of coefficients and α^A is the coefficient on t.

So,

$$w_i^A(t) = \exp(X_i^1 \beta^A + \alpha^A t)$$
$$= \exp(X_i^1 \beta^A) \exp(\alpha^A t)$$

Assume t_1 of the contract of training has elapsed.

Then the average wage for the remainder of the contract is given by the integral.

$$\overline{w_i^A}(t_1) = \frac{1}{D - t_1} \int_{t_1}^{D} \exp(X_i^1 \beta^A) \exp(\alpha^A t) dt$$
$$= \frac{\exp(X_i^1 \beta^A)}{D - t_1} \left[\frac{\exp(\alpha^A t)}{\alpha^A} \right]_{t_1}^{D}$$
$$= \frac{\exp(X_i^1 \beta^A)}{(D - t_1)\alpha^A} \left[\exp(\alpha^A D) - \exp(\alpha^A t_1) \right]$$

Similarly,

$$\overline{w_i^O}(t_1) = \frac{\exp(X_i^1 \beta^O)}{(D - t_1)\alpha^O} \left[\exp(\alpha^O D) - \exp(\alpha^O t_1) \right]$$

where $w_i^O(t)$ refers to the wage in alternative employment. Hence the wedge between wages in alternative employment and wages during training is given by the following.

$$wage\_wedge_i = \overline{w_i^O} - \overline{w_i^A}$$

This formulation assumes we know the duration of the contract (D). However, there is no standard duration and so we estimate it, using the same characteristics (X_i). Thus when modelling the overall probability of completing we use the average wages implied by $t_1 = 0$. Similarly, in the models considering attrition after six months we assume $t_1 = 183$ (t is measured in days), and so on.

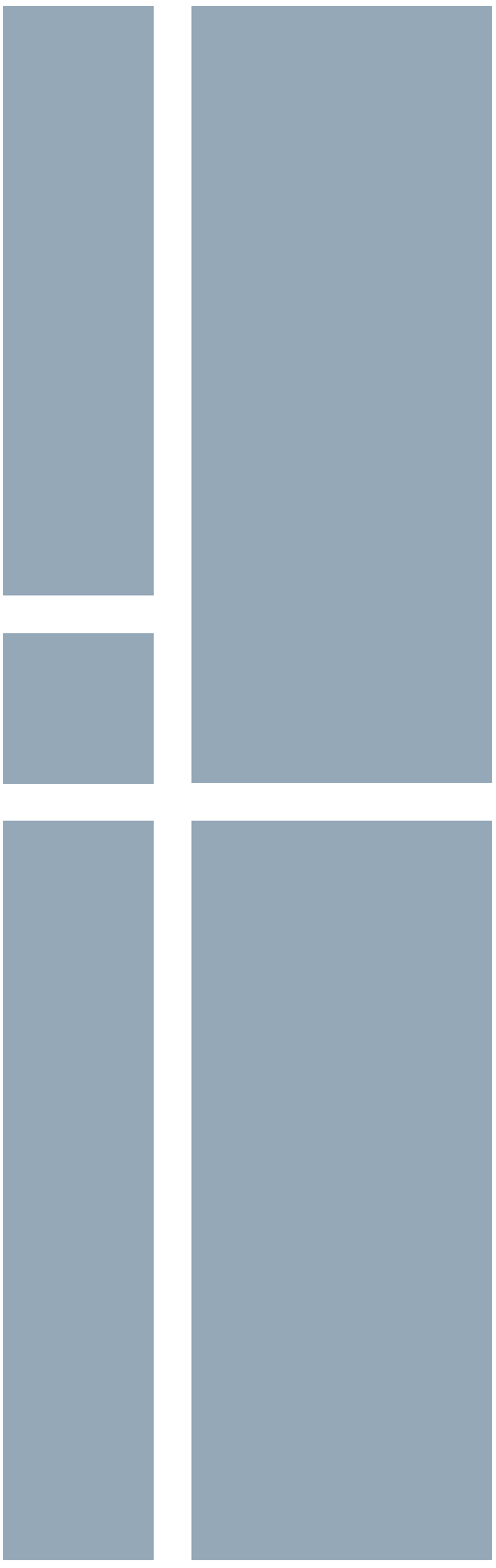
Appendix D: Supplementary tables

Table D1 Mean and proportion above zero of wedge between expected wage in alternative employment and wage during training, trades and non-trades (male/female)

		Trades		Non-trades (male)		Non-trades (female)	
		Mean ($)	% above zero	Mean ($)	% above zero	Mean ($)	% above zero
Trades:							
31	Engineering, ICT and science technicians	12 099.3	86.0	-	-	-	-
32	Automotive and engineering	12 613.3	99.0	-	-	-	-
33	Construction trades workers	13 185.6	99.2	-	-	-	-
34	Electrotechnology and telecommunications trades workers	11 000.7	96.0	-	-	-	-
35	Food trades workers	9 896.4	94.4	-	-	-	-
391	Hairdressers	11 137.5	100.0	-	-	-	-
All other trade occupations		15 724.0	99.2	-	-	-	-
Total		12 408.1	97.5	-	-	-	-
Non-trades:							
1+2	Managers and professionals	-	-	4 025.1	75.6	790.2	52.4
4	Community and personal service workers	-	-	7 863.2	95.8	1 085.6	69.6
5	Clerical and administrative workers	-	-	6 637.4	92.0	3 133.7	82.3
6	Sales workers	-	-	6 308.4	95.8	5 189.3	92.5
7	Machinery operators and drivers	-	-	3 276.3	76.0	-5 412.3	16.7
8	Labourers	-	-	7 461.9	99.2	13 434.5	100.0
Total		-	-	6 010.2	90.1	3 584.1	80.1

Table D2 Count of occupational dummy variables, trades and non-trades (male/female)

		Trades	Non-trades (male)	Non-trades (female)
Trades:				
31	Engineering, ICT and science technicians	50	-	-
32	Automotive and engineering	202	-	-
33	Construction trades workers	243	-	-
34	Electrotechnology and telecommunications trades workers	99	-	-
35	Food trades workers	144	-	-
391	Hairdressers	88	-	-
All other trade occupations		120	-	-
Total		946	-	-
Non-trades:				
1+2	Managers and professionals	-	41	42
4	Community and personal service workers	-	168	415
5	Clerical and administrative workers	-	274	513
6	Sales workers	-	191	414
7	Machinery operators and drivers	-	300	48
8	Labourers	-	249	117
Total		-	1 223	1 549



National Centre for Vocational Education Research Ltd
Level 11, 33 King William Street, Adelaide, South Australia
PO Box 8288, Station Arcade, SA 5000 Australia
Telephone +61 8 8230 8400 Facsimile +61 8 8212 3436
Website www.ncver.edu.au Email ncver@ncver.edu.au