

# **An Analysis of Factors Contributing to Apprenticeship and Traineeship Completion**

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by

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## **ABSTRACT:**

There has been a discernable focus within many Australian industries on improving the rates of completion amongst their apprentices and trainees. This paper outlines the results of a study which involved a multivariate analysis of data relating to apprenticeship and traineeship completion, derived from a database developed by the Victorian Government. The aim of the study was to investigate the relative strength of factors contributing to an individual's likelihood to complete or not complete an apprenticeship or traineeship and the interaction between these factors. The paper also attempts to interpret the results and findings from the above analysis, as well as identify and outline other areas for further research.

### Key Words:

apprenticeship completion, traineeship completion, factors affecting completion

# INTRODUCTION

An apprenticeship or traineeship is a formal contract between an employer and an apprentice or trainee to undertake vocational education and training. Traineeships and apprenticeships are offered to a variety of workers including those falling into one of the following groups:

- i) New entrants to the labour market
- ii) Re-entrants into the labour market
- iii) Existing workers who are looking to upgrade their skills with a specific employer

Apprenticeships and traineeships are available in a diverse range of industries and across a vast variety of occupational groups. Traineeships and apprenticeships also allow for training to be done on a full time or part time basis and can vary in their duration. In addition although most trainees and apprentices are engaged in a single training contract with a specific employer, some may change employer or the vocation they are training in and so may effectively enter into more than one training contract prior to completing an apprenticeship or traineeship (NCVER 2001).

The successful completion of a traineeship or apprenticeship requires the achievement of three specific tasks as listed below:

- Completion of formal off job requirements of the traineeship or apprenticeship, including completion of the qualification specified in the training contract.

- Completion of the indenture period of the contract of training, in addition to satisfying the employer endorsed on-the-job requirements.
- Once the above two requirements have been met, notification of the successful completion of the training contract by the trainee or apprentice, along with provision of required evidence substantiating the successful completion of the traineeship or apprenticeship must be provided to the relevant State or Territory training authority .

In recent years, many concerns have been expressed about the low completion rates of apprenticeships and traineeships (Karmel & Virk 2006). Throughout the history of the apprenticeship system, most apprentices have completed their term (Ray 2001a). Two mutually reinforcing factors contributed to this situation. The apprentice was legally bound by regulations and contract to serve for the whole period, and both parties had a strong self-interest in the completion (Smiths & Stromback 2001). These norms were strengthened by the regulatory framework that the Australian states developed early in the 20th century (Ray 2001b).

In addition, the structured labour market resulting from the operation of compulsory arbitration meant that it was difficult to attain the pay and status of a skilled worker without completing an apprenticeship (Harris et al. 2001). Thus for much of the 20th century, the completion rate of apprentices in Australia was quite high, in the 80-90 per cent range (Stromback 2006). In recent times, the completion rate has been lower (NCVER 2007). Although the exact reasons are not known, past experience suggests two reasons. While a legally binding contract is still in use changing community values means that it is not enforced on apprentices and, what matters more, not viewed by apprentices' as being binding

(Bender 2003). The second reason is that the labour market has become less structured (Cully & Curtain 2001). This means that the attainment of a tradesperson's status does not have the same value it once had.

When the traineeship system was introduced in 1985, it shared many of the features of the apprenticeship system on which it was based. Over time, the common institutional framework has reduced some of the remaining differences. Thus, the features that underpin the completion of traineeship are essentially the same as for an apprenticeship, but their effects are weaker. Traineeships have not benefited from the strong behavioural norms that have governed apprenticeship training (Grey et al. 1999). Also, many occupations and industries in which traineeships are used have a tradition of a weak attachment between employer and employee. The self-interest in completion of both parties is weaker. The unstructured nature of labour markets means that the gain to a trainee completing is small, and the lower cost to the employers means that they are less concerned about recovering this cost from the trainees.

The expected differences in completion rates between apprentices and trainees were clearly evident during the early days of the operation of the traineeship system. However, with only a small number of trainees, the principal policy issue was not the completion rate but the low rate of commencements. As trainee numbers began to grow quickly in the mid-nineties, the situation changed. The traineeship system became a more significant institution, and as regular comprehensive statistics were published, the low completion rate of trainees became much more visible (NCVER 2005).

High rates of non completion amongst apprentices has been recognised as being costly for employers who invest significant time and resources into offering such training opportunities but may receive little or no return for their efforts (WADOT 1998). Consequently it has been recommended that more research be undertaken to monitor and measure rates of completion and employment outcomes for trainees and apprentices on a provider, industry and qualification specific basis (Callan 2000). The poor completion rates amongst apprentices and trainees has also been the focus of numerous policy forums and discussions over the years, with the need to establish improved outcomes repeatedly being highlighted (Australian Senate Committee 2003, NCVER 2001).

During the past decade, the completion rates of apprentices and trainees have therefore been extensively analysed in a number of papers and reports. Most of these have been undertaken by, or under the auspices of, the National Centre for Vocational Education Research (NCVER). The early studies of the completion rate, for those commencing up to the mid-nineties, found a trainee completion rate of 55-61 per cent, while the rate for apprentices was in the 70-77 per cent range (NCVER 2002). More recent evidence (Ball and John 2005), however, suggests that the problem is not confined to trainees. The completion of traditional apprenticeships also seems low at 60 per cent for the cohort beginning training in 1999.

The concern with the apparently low rates of completion, and the problems with inferring a completion rate from aggregate data on commencements and completions, led the NCVER to develop a comprehensive data base from which to measure the completions rate more accurately. This data tracks individuals through time so that the completion status of each individual can be determined. The data set was first used in Ball (2005) and in a more

comprehensive report by Ball and John (2005). These reports provide some benchmark national data against which the Victorian situation can be compared.

In this paper a more comprehensive data base developed for Victorian apprentices and trainees was used. In this data base in order to determine their completion status, commencing cohorts of apprentices and trainees are tracked over time. The data base also contains information about the personal characteristics of apprentices and trainees as well as information about their employer and training provider. This data shows considerable variation in the completion rates between occupational groups, employer and provider types and according to individual characteristics of apprentices and trainees.

The main objective of the study outlined in this paper was to undertake a multivariate analysis of this data set to investigate the relative strength of factors contributing to an individual's likelihood to complete or not complete an apprenticeship or traineeship and the interaction between these factors. Other aims of the study included interpreting the results and the findings from the above analysis along with identifying and outlining other areas for further research and analysis.

# **IMPACT OF STUDENT, CONTRACT, EMPLOYER AND PROVIDER CHARACTERISTICS ON THE PROBABILITY OF COMPLETION**

## **Method**

Individual choice between discrete alternatives is based on the preference of the individuals and the individual specific opportunities they face. Since these are unobservable, any statistical analysis must proceed on the basis that there is a systematic relationship, common to all individuals, between these underlying determinants and observable characteristics of the individuals. Given this assumption, the effects of these observable characteristics can be determined by estimating the parameters of a statistical model that links the observed completion status to these observable factors.

The particular model used, the probit model, is part of a more general class of models based on the assumption that the probability of an individual making a certain choice can be represented as a function of individual specific factors and a stochastic variable. The presence of a stochastic component means that it is not possible to estimate what particular choice an individual will make. Hence the model can only generate expressions for the probability that a certain choice will be made.

The observable factors fall into four groups, i.e. factors pertaining to:

- i) The individual student
- ii) Training contract
- iii) Employer of the apprentice or trainee, and
- iv) Training provider

The factors included in the estimation of the probability of completing an apprenticeship or traineeship are listed in Table 1.

In the analysis, each value of a factor is represented by a separate variable but omitting one value for each factor. For example, gender is represented by two variables, ‘female’ and ‘male’. Omitting ‘female’ means that females are taken as the base case and we then estimate the effect of ‘varying’ gender from female to male. The choice of specific base cases was made on the premise of what was most common for that particular variable. Consequently the ‘18-20’ years old age group was selected as the base case for the age factor as this represented the most common age group that apprentices and trainees belonged to. In like manner, ‘English only’ was chosen as the base case for the factor representing ‘Language spoken at home’ due to its higher prevalence amongst apprentices and trainees when compared to the ‘Language other than English’ option. The base cases have been asterisked within the included Tables.

**Table 1: List of factors included in the estimation of the probability of completing an apprenticeship or traineeship**

	<b>Factor</b>	<b>Values</b>
<b>Student</b>	Gender	Female* Male
	Age (years)	<=17 18-20* 21-25 26-35 >35
	Level of schooling	Did not go to school Year 8 Year 9 Year 10 Year 11 Year 12*
	Country of birth	Australia* Main English speaking countries Other countries
	Language spoken at home	English only* Language other than English
	Indigenous status	Non indigenous* Aboriginal /Torres Strait Islander

	Pre-apprenticeship	Have not done a pre-apprenticeship* Done a pre-apprenticeship
	Postcode	TAFE catchment area if provider is TAFE; Ballarat* Bendigo CBD Central Gippsland East Gippsland Eastern Geelong Goulburn Ovens North West South East Southwest Sunraysia Wodonga Interstate
<b>Contract</b>	Year of commencement	1995 to 2002
	AQF level	6 levels; Certificate I to Advanced Diploma
	Scheme	New entrant Existing employee*
		Full-time

		Part-time*
	Occupation	90 occupations
	Industry	23 industries
<b>Employer</b>	Employer sector	Private* Group Training Government
	Employer size (no. of employees)	<=5 6-20 21-100 >100*
	Location (post code)	Metro Non-Metro*
<b>Provider</b>	Provider type	TAFE Private Not known*
	Location (post code)	Metro Non-Metro*

The parameters of the probit model give the effect of a change in a variable on an underlying latent variable that represents the tendency to complete. Since these parameters are awkward to interpret it is common to present the marginal probabilities of the effect of each of the variables included in the model. When all the variables are binary, as is the case here, these marginal probabilities represent the effect of a unit change in the one of these binary variables holding all the other variables constant. Essentially, the marginal probabilities show how the probability of completion varies by varying the value of one variable while holding the values

of all other variables constant. Since the model is non-linear, this effect depends on the values of the other variables at which the effect is evaluated. The convention is to set all the other variables at their mean value. This means that the marginal effect is evaluated for the average person in the population.

From a preliminary analysis of the data it was clear that the relationship between the probability of completing and the underlying factors are quite different for apprentices and trainees. Thus the model was estimated for apprentices and trainees separately.

## **Results**

### Marginal probabilities

As explained above, the results of the statistical analysis is best understood in terms of the marginal probabilities derived from the estimated parameters. These marginal probabilities are reported in Table 2 below for apprentices and trainees separately.

Because of the large number of observations these estimated marginal probabilities are estimated with great precision. Using the jargon of statistical inference, in most cases they have small standard errors and are statistically different from zero. In view of this it serves little purpose to report the standard errors or significance level of the estimates.

How to read this table is best explained by two examples using the estimates pertaining to apprentices.

### **Example 1: Gender**

This factor is represented by a single variable that takes the value 0 if the person is female and 1 if the person is male. We take female as the (omitted) base case and then compute how the probability of completion would change if the person was male rather than female. According to the table this would decrease the probability of completion by 0.001. In other words, the effect of gender on the probability of completion is negligible.

### **Example 2: Level of schooling**

This factor is represented by six binary variables, each representing a certain level of schooling. In this case omitted variable is completing Year 12 and the marginal probabilities represent the change in probability relative to this base case. According to the estimates, a student whose highest level of schooling is Year 11 has a 0.093 lower probability of completing than the student with Year 12. For lower levels of schooling the probability is even lower. More specifically, the marginal probabilities become smaller (larger negative numbers) as the highest level of schooling is lowered. Stated more plainly, this means that the probability of completion is increasing in the level of schooling. The probability of completion is lowest for a student with Year 8 only and highest for a student with Year 12.

When a factor takes on several values the differences between any pair of marginal probabilities can be taken as an approximate estimate of the effect of changing from any schooling level (not necessarily the base case) to another. For example, changing the level of schooling from Year 10 to Year 11 would increase the probability of completion by

$$-0.093 - (-0.156) = 0.063$$

## Apprentices

### **Student Factors**

According to the estimated marginal probabilities the student variables that have a large effect on completion include the level of schooling, indigenous status and having done a pre-apprenticeship. We have already commented on the impact of the level of schooling, but it needs to be pointed out that this effect is very large. Having completed a pre-apprenticeship also has a large positive effect on the probability of completion while indigenous status has a large negative effect.

Some other factors have a moderately large impact on the likelihood of completion. These include being born overseas which has a negative effect on completion. With regard to the language spoken at home, it is those who speak English only who have a lower probability of completion. Age of commencement also has an impact. Although there appears to be little difference in the marginal probability of completion for apprentices aged 17 years or less and those older than 35 years, apprentices in the 21-25 and 25-35 age groups seem to have a distinctly lower probability of completing.

The students' postcode is assigned to be in one of 14 TAFE catchment areas. In Table 2, this factor seeks to capture the influence of a TAFE college on completions and applies only to students with a TAFE provider. The results show that two areas stand out CBD and Wodonga. TAFE students who live in these areas have a distinctly lower probability of completion than those who live in the other areas. Of course the area in which a student lives can have an effect on completion which is independent of any effect of a particular TAFE college. To test whether this is a college or location effect, a location effect was also estimated for all students

but the detailed results of this have not been included in this article. Comparing the estimated marginal probabilities of the two cases shows that the estimates are very similar. This suggests that the effect of TAFE area on completions reflects a location rather than a college effect. If the effect operated exclusively via colleges, the estimates pertaining to all students should have been smaller than the estimates pertaining to the TAFE students only.

### **Provider Factors**

The type of provider has the largest single effect on the probability of completion. Taking the 'other' category as the base case, students with a TAFE provider have a 0.391 larger probability of completing and those with a private provider a 0.252 larger probability. One should also note the fairly large difference between these two numbers which implies that TAFE students are much more likely to complete than those with private providers.

### **Contract Factors**

As can be observed from the aggregate data, the completion rate of apprentices dropped from 65.7 per cent for the 1995 cohort to 64.4 per cent for the 2000 cohort. This is a very small decline and probably not of any great concern. However, after controlling for all other factors it is evident that this trend decline is stronger. The probability of a student from the 2000 cohort completing is 0.147 lower than the corresponding probability of a student from the 1995 cohort. This is quite a larger difference and the nature of the effect indicates a downward trend. What this means is that the composition of the later cohorts have become more favourable to completing. In the absence of this favourable compositional shift, the completion rate would have dropped much more than it actually has. This trend decline is associated with the declining proportion of 'other' providers.

With regard to the other contract factors, there is no real difference between new entrants and existing employees. However, whether an apprenticeship is undertaken part or full time has a large effect. Full time apprentices have a much larger probability of completing compared to those who do their apprenticeship part-time. This is not, however, a very significant issue since virtually all apprenticeships are full-time.

### **Employer Factors**

With respect to the factors associated with employer characteristics, the results indicate that the size of employer, as measured by number of employees does not greatly affect the probability of completing. Employer type, however, appears to have an impact. An apprentice doing an apprenticeship with a group trainer has a distinctly lower probability of completing compared to those doing an apprenticeship with a private or government employer.

### **Industry and Occupation**

Occupation and industry are overlapping classifications, i.e. each industry is comprised of a distinct subset of occupations. For that reason the marginal probabilities are estimated separately by industry and occupational group. This means that industry and occupational groups are alternative classifications - industry being the broader and occupational group the finer classification.

The estimates indicate that even after controlling for all other factors, the industry of an apprenticeship has a large effect on the probability of completion. More specifically, there are a small number of industries for which the industry effect on completion is very large. In

order of magnitude, the three industries that stand out are Tourism and Hospitality, Food Processing and Textile, Clothing and Footwear. The last of these has only a small number of apprentices and is of little interest for policy purposes. As regards the first two, the occupations in questions are baker, butcher and cooking (i.e. chef). Thus, ignoring the detail, apprentices divide into two groups as far as the probability of completion is concerned. One group is the mechanics, in the auto repair, building, metal and engineering trades. The other is the food occupations; the bakers, butchers and chefs, who have a distinctly lower probability of completing than apprentices in the first group.

**Table 2: Estimated marginal probabilities: Student, Employer, Provider and Contract factors**

Factor	Value	Apprentices		Trainees	
		Marginal probabilities	Proportion of apprentices	Marginal probabilities	Proportion of trainees
Gender	Female	*	0.126	*	0.515
	Male	-0.001	0.874	-0.039	0.485
Age at commencement	<=17	0.065	0.404	0.015	0.095
	18-20	*	0.419	*	0.239
	21-25	-0.015	0.107	-0.015	0.191
	25-35	0.026	0.047	0.020	0.202
	>35	0.063	0.023	0.095	0.273

Level of schooling	Did not go to school			-0.020	0.000
	Year 8	-0.321	0.002	-0.073	0.009
	Year 9	-0.253	0.086	-0.064	0.091
	Year 10	-0.156	0.271	-0.055	0.212
	Year 11	-0.093	0.264	-0.036	0.209
	Year 12	*	0.377	*	0.479
Country of birth	Australia	*	0.998	*	0.965
	Main English speaking country	-0.095	0.012	-0.026	0.035
	Other country	-0.066	0.022	-0.017	0.081
Language spoken at home	English only	*	0.969	*	0.906
	Other language	-0.043	0.031	-0.017	0.094
Indigenous status	Non-indigenous	*	0.999	*	0.998
	Indigenous	-0.154	0.001	-0.135	0.002
Pre-apprenticeship	Have not done a pre-apprenticeship	*	0.957		
	Done a pre-apprenticeship	0.147	0.043		
Commencement year	1995		0.121		0.011

	1996	-0.038	0.132	-0.006	0.023
	1997	-0.081	0.141	-0.057	0.041
	1998	-0.118	0.179	-0.083	0.097
	1999	-0.145	0.209	-0.095	0.157
	2000	-0.147	0.218	-0.097	0.181
	2001			-0.077	0.213
	2002			-0.106	0.277
Existing employee/New entrant	Existing employee	*	0.042	*	0.201
	New entrant	0.022	0.958	-0.010	0.799
Part-/Full-time	Part-time	*	0.008	*	0.326
	Full-time	0.157	0.992	0.061	0.674
Employer type	Private	*	0.826	*	0.867
	Group training	-0.092	0.146	0.035	0.101
	Government	-0.002	0.028	0.100	0.032
Employer size (no. of employees)	<=5	-0.093	0.287	-0.032	0.089
	6-20	-0.089	0.266	-0.038	0.176
	21-100	-0.062	0.196	-0.038	0.264
	>100	*	0.251	*	0.439
Provider type	TAFE	0.391	0.779	0.279	0.263
	Private	0.252	0.081	0.229	0.644

	Not known	*	0.140	*	0.093
Employer location	Non-metro	*	0.315	*	0.326
	Metro	-0.060	0.685	-0.017	0.674
Provider location	Non-metro	*	0.197	*	0.294
	Metro	-0.029	0.803	0.017	0.706
AQF level	Certificate I			0.095	0.001
	Certificate II			0.002	0.349
	Certificate III			*	0.587
	Certificate IV			-0.026	0.061
	Diploma			-0.033	0.002
	Advanced Diploma			-0.079	0.000
Student home post code	Ballarat	*	0.034	*	0.012
(if provider Is TAFE)	Bendigo	-0.016	0.038	-0.017	0.017
	CBD	-0.098	0.004	-0.163	0.002
	Central Gippsland	0.005	0.034	-0.019	0.013
	East Gippsland	0.005	0.012	-0.017	0.004
	Eastern	-0.017	0.157	-0.065	0.043
	Geelong	-0.025	0.049	-0.012	0.019
	Goulburn Ovens	0.014	0.039	0.016	0.024

	North West	-0.028	0.203	-0.055	0.059
	South East	-0.001	0.145	-0.054	0.041
	Southwest	0.042	0.020	0.024	0.011
	Sunraysia	-0.065	0.015	-0.040	0.008
	Wodonga	-0.138	0.020	0.017	0.006
	Interstate	-0.102	0.009	-0.152	0.002

**Table 3: Estimated marginal probabilities: Industry and occupational group, Apprentices**

Industry and occupational group	Apprentices		Occupational group	Apprentices	
	Marginal probability	Proportion of apprentices		Marginal probability	Proportion of apprentices
Automotive	-0.010	0.168	Repair Service and Retail	-0.007	0.168
Building and Construction	*	0.278	Civil Operations	-0.063	0.016
			General Construction	*	0.194
			Plumbing Services	0.016	0.068
Community Services and Health	-0.061	0.003	Health Sciences and Acute Care	-0.060	0.003

Racing	-0.120	0.002	Racing	-0.122	0.002
Electro-technology and Communications	0.042	0.118	Electrical and Electronics	0.042	0.097
			Printing	0.052	0.022
Food Processing	-0.170	0.054	Baking	-0.226	0.037
			Meat	-0.042	0.017
Textile Clothing and Footwear	-0.132	0.004	Clothing	-0.178	0.002
			Footwear	-0.188	0.001
			Textiles	-0.064	0.001
Furnishing	-0.086	0.059	Laundry and Dry Cleaning	-0.126	0.001
			Furnishing	-0.083	0.058
Metals and Engineering	0.025	0.129	Aerospace	0.065	0.007
			Engineering	0.024	0.121
Primary	-0.123	0.020	Agriculture	-0.176	0.006
			Amenity Horticulture	-0.097	0.014
Tourism and Hospitality	-0.195	0.092	Cookery	-0.196	0.092
Wholesale Retail and Personal Services	-0.050	0.074	Floristry	-0.072	0.005
			Funeral	0.008	0.000
			Hairdressing	-0.053	0.069

**Table 4: Estimated marginal probabilities: Industry and occupational group, Trainees**

<b>Industry and occupational group</b>	<b>Trainees</b>				
<b>Industry</b>	<b>Marginal probability</b>	<b>Proportion of trainees</b>	<b>Occupational group</b>	<b>Marginal probability</b>	<b>Proportion of trainees</b>
Automotive	-0.142	0.024	Repair Service and Retail	-0.151	0.016
			Vehicle Manufacturing	0.011	0.008
Building and Construction	-0.217	0.002	Civil Operations	-0.132	0.000
			General Construction	-0.175	0.001
			Plumbing Services	-0.220	0.000
Water	0.189	0.001	Water	0.220	0.001
Business Services	*	0.237	Business Administration	0.079	0.109
			Business Management	-0.056	0.000
			E Commerce		
			Human Resources	0.293	0.001
			Insurance	-0.029	0.000
			Legal Administration	0.128	0.001

			Marketing and Sales	0.037	0.003
			Cross Industries	*	0.038
			Accounting	-0.107	0.000
			Finance	-0.102	0.013
			Cleaning and Waste Management	0.031	0.034
			Real Estate	-0.033	0.005
			Security	0.050	0.032
Other	0.151	0.001	Education	0.190	0.001
Community Services and Health	0.055	0.072	Children's Services	0.079	0.014
			Community Support	0.095	0.013
			First Aid and Occupational Health and Safety		
			Community Health	0.030	0.007
			Health Sciences and Acute Care	0.075	0.003
			Residential and Home Care	0.121	0.035
Cultural and Recreation	0.031	0.014	Arts and Design	0.053	0.001
			Entertainment	0.069	0.002
			Recreation	0.079	0.011
Racing	-0.008	0.001	Racing	0.026	0.001

Electro-technology and Communications	-0.131	0.088	Call Centres	-0.046	0.048
			Communications	-0.034	0.005
			Electrical and Electronics	0.078	0.004
			Information Technology	-0.192	0.029
			Printing	-0.028	0.002
Food Processing	-0.161	0.056	Baking	-0.223	0.002
			Dairy	-0.210	0.001
			Fruit and Vegetables	-0.406	0.000
			General	-0.187	0.019
			Meat	-0.076	0.031
			Milling and Confection	0.210	0.000
			Other Foods		
			Pharmaceutical Manufacturing	0.139	0.000
			Wine and Other Beverages	-0.086	0.003
Process Manufacturing	-0.083	0.009	Chemical, Hydrocarbons and Oils	0.157	0.001
			Environmental Management		

			Lab. Skills and Other Manufacturing	-0.215	0.000
			Non Metallic Mineral Products	-0.171	0.001
			Petro, Rubber and Cables	-0.063	0.007
Textile Clothing and Footwear	-0.034	0.010	Clothing	-0.169	0.001
			Footwear	-0.222	0.001
			Leather	-0.321	0.000
			Textiles	0.042	0.009
Furnishing	-0.165	0.002	Laundry and Dry Cleaning	-0.100	0.000
			Furnishing	-0.132	0.002
Metals and Engineering	-0.121	0.015	Aerospace	0.262	0.000
			Engineering	-0.089	0.014
			Mining	-0.096	0.001
Primary	-0.069	0.033	Agriculture	-0.090	0.012
			Conservation	0.034	0.001
			Production Horticulture	-0.071	0.002
			Amenity Horticulture	0.004	0.016
			Animal Care	0.133	0.001

			Fish Harvesting	-0.011	0.001
Forest	-0.117	0.005	Forest and Forest Products	-0.076	0.005
			Paper and Paper Products	-0.117	0.000
Tourism and Hospitality	-0.087	0.096	Cookery	-0.185	0.003
			Hospitality	-0.042	0.091
			Hospitality - Caravan	-0.076	0.000
			Tourism	-0.016	0.003
Transport and Storage	-0.017	0.102	Storage and Distribution	0.012	0.054
			Air	0.005	0.000
			Marine	0.194	0.001
			Rail	0.174	0.002
			Road	0.014	0.044
Wholesale Retail and Personal Services	-0.080	0.227	Floristry	-0.132	0.000
			Funeral	0.256	0.000
			Beauty Services	-0.031	0.000
			Hairdressing		
			Other Personal Services		
			Retail	-0.040	0.226

			Wholesale	-0.125	0.000
Adult Community and Further Education	-0.074	0.001	General Preparatory	-0.025	0.001
			Language and Literacy		
			Languages Other Than English (LOTE)		
			VCE/VCAL		
			Work Education		
Public Administration and Safety	-0.032	0.005	Government Administration and Services	-0.058	0.001
			Public Order and Safety	0.039	0.004

## Trainees

The results for trainees share some similarities with the results for apprentices but there are also a number of differences.

## **Student Factors**

Gender and language spoken at home appear to have a small effect on the likelihood of completion. Country of birth, however, has only a small effect but indigenous status has about the same effect on the completion of traineeships as it has on the completion of apprenticeships. The effect of age also differs between traineeships and apprenticeship. For traineeships the age effect displays the same pattern, the young and the old have a higher probability of completing, but the magnitude of the age effect is smaller.

Level of schooling has a much smaller effect on the completion of traineeship. For example, trainees who complete Year 12 have only a 0.036 higher probability of completing than those with Year 11. For apprentices the corresponding figure is 0.093.

## **Contract Factors**

In contrast to apprentices, the completion rates of different cohorts of trainees have remained almost constant during the 1995-2002 period. Still, after controlling for other factors we find that the probability of completing has declined for successive cohorts. In the case of traineeships the estimates of the marginal probabilities do not follow a trend. Rather there is a distinct fall in the probability of completion after 1997 or 1998. Since the completion rate has remained roughly constant, this means that traineeship completions, like apprenticeship completions, have also been favourably affected by compositional changes. As is the case for apprentices, this cohort effect is associated with the decline in the 'other' type of providers.

The level of qualification was not included for apprentices since they all do an AQF level 3 qualification. For trainees we find that the AQF level has no real impact on the probability of completion. There is some weak evidence that the probability of completion is lowest for Level 1 and Level 6 (Advanced Diploma) qualifications but due to the small number of students the marginal effects are not precisely estimated.

### **Employer Factors**

As was the case with apprentices, employer size does no impact on the likelihood of completion among trainees. However, the effect of employer type is very different for apprentices and trainees. Trainees with a Government employer have a higher probability of completion than those with a private employer. Trainees employed by a Group Trainer also have a higher probability of completion than those employed by a private employer.

### **Provider Factors**

The effect of the provider factors on the likelihood of completion by trainees was found to be essentially the same as for apprentices with ‘other’ providers having a very large negative effect on the probability of completion.

### **Industry and Occupational Group**

Compared to apprenticeships, traineeships are spread over a much larger number of industries and occupational groups. The large number of industries and occupational groups makes it difficult to discern any clear patterns in the results.

Using the industry classification we find that relative to Business Services (the industry taken as the base) several other industries are associated with a much lower probability of completion. These include the largest employer of trainees, the Wholesale, Retail and Personal Services industry and also some other large trainee employer industries such as Electro-technology and Communications, Food Processing and Tourism and Hospitality.

Industries associated with the same or higher probability of completion (than Business Services) are fewer and include only one large trainee employer, the Community Services and Health industry.

Grouping industries that employ most of the trainees into those that are associated with high and low marginal probabilities results in the following two groups:

Industries with a high marginal probability

- Business Services
- Community Services and Health
- Cultural and Recreation

Industries with intermediate marginal probability

- Tourism and Hospitality.
- Wholesale, Retail and Personal Services

## Industries with a low marginal probability

- Food Processing
- Automotive
- Electro-technology and Communications
- Metals and Engineering

The problem with this grouping is that common factors are difficult to identify. At best there is a resemblance of a pattern according to the perceived status or attractiveness of the work. The low probability category includes mainly industries in which manual work is dominant. At the other end of the scale are the business and community services industries, while the main service industries are in the intermediate group. Apart from that, the results that stand out are the probabilities in the food and hospitality industries. Both apprentices and trainees in these industries have a much lower probability of completing than students in other industries.

The occupational group classification adds further details to the differences between industries. While this additional detail may be useful for some purposes, on the whole it makes it even more difficult to identify any pattern in the results. For example, listing occupational groups by the magnitude of the estimated marginal probabilities result in the following:

**Table 5: Occupational groups with the largest estimated marginal probabilities**

Occupational group	Marginal probability	Proportion of trainees
Human Resources	0.293	0.001
Aerospace	0.262	0.000
Funeral	0.256	0.000
Water	0.220	0.001
Milling and Confection	0.210	0.000
Marine	0.194	0.001
Education	0.190	0.001
Rail	0.174	0.002

**Table 6: Occupational groups with the smallest estimated marginal probabilities**

Occupational group	Marginal probability	Proportion of trainees
Fruit and Vegetables	-0.406	0.000
Leather	-0.321	0.000
Baking	-0.223	0.002
Footwear	-0.222	0.001
Plumbing Services	-0.220	0.000
Lab. Skills and Other		
Manufacturing	-0.215	0.000
Dairy	-0.210	0.001
Information Technology	-0.192	0.029

This ordered listing reveals that most of the outliers, occupational groups with very high or very low marginal probabilities comprise mainly occupational groups with very small number of trainees. Because of this they are of limited interest for policy purposes. Additionally, the small number of observations on which the estimates are based mean that these marginal probabilities are not precisely estimated. This is another reason for not paying much attention to these two sets of figures.

Beyond that, however, there is little to be learned from simply inspecting the numbers. Unless additional information can be invoked one is forced to conclude that for most purposes the occupational grouping results in excessive detail. For policy purposes, the marginal effects of industry should be of greater interest.

### Conceptual interpretation of the findings

The results presented above show that the probability of an individual completing an apprenticeship or traineeship depends on a range of personal, contract, employer and provider factors. While the effect of each can be ascertained, to make sense of the results as a whole some kind of interpretative framework is required.

The most common framework for analysing issues of this nature is to suggest that new information drives the process. A person embarks on an apprenticeship in the belief that it is the best available option for them. If they then fail to complete, it must be because they receive new information, information they did not have when they made their initial decision,

which indicates that an alternative option is better. The new information could comprise information about the value of the current match, the existing apprenticeship, as well as new information about alternative opportunities. A concept that captures the essence of this perspective is the term “match quality”. This term captures the notion that it is not the characteristics of the person, or the nature of the job, that determines how long a match lasts, but rather the fit between the person and job.

This perspective provides some, but not very strong, predictions of how the probability of completion might relate to the set of factors included in the analysis. An existing employee, who must have longer job tenure than a new employee, ought to be more likely to complete similarly, older persons ought to be more likely to complete. They should be better informed than the young and hence new information should have less impact on their actions. The same might be said about more educated persons, but the level of education represent other factors as well- notably the potential productivity and hence the availability of alternative opportunities.

At best, the findings are broadly compatible with this perspective. The most clear cut finding is the large positive effect of having done a pre-apprenticeship. Similarly, it is plausible to suggest that those born overseas are less informed about apprenticeships and traineeships than the Australian born. Also, while the effect of age is weak, it is in the expected direction. Therefore the results seem to indicate that the probability of completion is higher for trainees and apprentices aged above 25 years, than those younger than 25 years of age. Of course, the youngest age group does not conform to this pattern, but this could be explained by the more limited job opportunities available to youth.

However, even if several of the student factors have an effect in the expected direction it remains the case that industry/occupation, employer and provider effects are just as important. A particularly unfavourable combination of factors is undertaking an apprenticeship in cookery, being employed by a group training company and having a private provider. An individual student, irrespective of who he or she is, is unlikely to complete an apprenticeship under this set of circumstances.

The influence of student factors suggests that the remedy to low completion rates is to be found in more information to prospective apprentices and trainees. However, even though there is widespread ignorance about traineeships in particular, there is vast amount of information available for anybody who wants to find out. Consequently, it is difficult to think of what more could be done to further inform prospective apprentices and trainees about what they are to embark on.

On the other hand, to the extent that low completion can be traced to the practices of employers and training providers and the conditions of work in the different industries and occupations there may be more scope for addressing the situation. Up to a point, of course, some things have to be taken as given. Private sector employers are subject to the vagaries and pressures of the market. Similarly, occupational effects that have to do with the nature of work cannot readily be changed – a chef has to do what a chef does. At the same time, however, employers cannot persist with practices that result in most recruits leaving the industry before they are competent. In the past blacksmiths found it difficult to recruit and keep their apprentices for the same types of reason. While fundamental changes can hardly be contemplated there is still scope for improvements at the margin.

Finally it should be emphasised that the analysis is necessarily restricted to variables included in the data set used. This means that the included variables are to some extent proxies for more fundamental but unobservable factors. This applies particularly to the industry effect which in part may reflect the impact of relative pay on completions. There are two dimensions of pay. The current pay of a trainee or apprentice relative to other employees doing similar jobs and how future pay depends on completion. With regard to the latter factor, in many industries the future pay is not highly dependent on whether a person has actually completed a qualification or not. The food industry is a case in point; in which formal qualifications are not highly regarded and hence the financial incentive to complete can be weak. In contrast, in trades with licensing requirements (for example such as in the case of electricians and plumbers), a formal qualification that can only be obtained by completing an apprenticeship, is often a pre-requisite for carrying out skilled work.

## **PROJECTING COMPLETION RATES**

The completion rate can not be measured until a sufficiently long time has elapsed since commencement. In case of apprentices this time period is six years and four years for trainees. Thus the last cohorts of apprentices began their apprenticeship in 2000 and the trainees in 2002. To provide a more current perspective, this section reports the findings from two methods of projecting the completion rate beyond the estimation period.

# Projections based on the observed retention rates

Although the completion rate cannot be measured until a long time has elapsed since commencement, a more up-to-date indicator is provided by the x-months retention rate. More specifically, for apprentices one might use the 12-months retention rate - the proportion of apprentices who have not cancelled their contract within the first 12 months of commencement.

Tabulating the observed completion rates and the retention rates we note that the ratio of the two series is almost constant. This is not surprising. About one third of those who eventually cancel their contract have done so within the first 12 months. Given this fact one might use the retention rate as a predictor of the completion rates. For apprentices it can be seen that the 12-months retention rate has been constant since 1995, leading to the obvious prediction that the completion rate for the post-2000 cohorts are likely to be the same as for the earlier cohorts.

**Table 7: Completion rates and 6- and 12-months retention rates: 1995-2005**

	Apprentices		Trainees	
Year of Commencement	Completion rate	12-month retention rate	Completion rate	6-months retention rate
1995	0.657	0.876	0.549	0.817
1996	0.656	0.881	0.533	0.796

1997	0.645	0.881	0.499	0.838
1998	0.660	0.896	0.541	0.854
1999	0.643	0.887	0.542	0.835
2000	0.645	0.879	0.538	0.838
2001		0.878	0.559	0.842
2002		0.880	0.539	0.849
2003		0.873		0.862
2004		0.876		0.849
2005		0.871		0.843

For trainees we have used the shorter period of six month to measure the retention rate. In this case the ratio of the retention and completion rates is more variable, but the relationship has stabilised from 1998 and onwards. Thus, one can be reasonably confident that the completion rates for the post-2002 cohorts will be about the same as for the earlier cohorts.

## **Projections using the estimated parameters**

Another way in which to project completion rate is to use the estimated parameters of the probit model. Although we cannot measure the completion rate of the post-2000 cohorts of apprentices, we know who they are. That is, we know values of all but one of the factors that determine their probability of completing.

The unknown factor is the cohort effect. As was noted previously, the later cohorts and apprentices in particular were found have a lower probability of completion than earlier cohorts. For the purpose of projecting this beyond the sample period, we have represented this effect by a linear time trend. But there are trends in other factors as well. In 1995 ‘unknown’ providers accounted for a significant share of contracts, but their role has gradually declined. Most of this decline took place during the 1995-2000 period and by 2006 there were very few unknown providers. Furthermore, as the role of ‘unknown’ providers has declined the completion rate of these contracts has decreased.

There are, in other words several trends and the problem with trying to project completion rates into the future is the strong interactions between a cohort effect, the changing composition of provider types and the completion rates by provider type.

**Table 8: Observed and predicted completion rates: 1995-2006**

	Apprentices			Trainees		
	Observed	Predicted		Observed	Predicted	
		No time trend	Time trend included		No time trend	Time trend included
<b>1995</b>	.655	.613	.675	.543	.512	.535
<b>1996</b>	.653	.645	.685	.535	.508	.525
<b>1997</b>	.644	.659	.677	.500	.506	.518
<b>1998</b>	.660	.675	.673	.539	.539	.551

<b>1999</b>	.643	.678	.654	.544	.550	.558
<b>2000</b>	.644	.678	.632	.538	.548	.549
<b>2001</b>		<i>.671</i>	<i>.599</i>	.558	.546	.542
<b>2002</b>		<i>.678</i>	<i>.575</i>	.540	.553	.543
<b>2003</b>		<i>.682</i>	<i>.550</i>		<i>.563</i>	<i>.546</i>
<b>2004</b>		<i>.695</i>	<i>.531</i>		<i>.552</i>	<i>.529</i>
<b>2005</b>		<i>.698</i>	<i>.502</i>		<i>.548</i>	<i>.518</i>
<b>2006</b>		<i>.696</i>	<i>.470</i>		<i>.547</i>	<i>.510</i>

Note: The predicted values (in italics) are obtained by projecting the completion rates beyond the estimation period 1995-2000 (2002 for trainees) using the observed values of the characteristics of students commencing in 2001 (or 2003) and later.

To understand the predictions in Table 8, it should be added that the effects in questions are large. In case of apprentices the effect of the trend is to lower the predicted completion rate by almost 2 percentage points per year. Thus including a time trend results in the rather dismal prediction that the completion rate of apprentices commencing in 2006 will be 47 per cent! For the reasons mentioned above, not much confidence can be placed in this prediction as it might reflect the effect of the trend in provider types. This latter trend we know does not continue beyond the sample period.

Some of the interactions could be disentangled by interacting the time trend with provider types. This would imply that a separate time trend was estimated for each type of provider. This would result in a much better fit between observed and predicted during the sample period. However, the resulting predictions would not necessarily be any better. As we try to account for more of the variation over the sample period the estimated becomes less robust,

i.e. more sensitive to the particular observed patterns in the data. Thus, in view of the changing pattern of provider types, it would be hazardous to presume that any trends estimated from the completion data over the 1995-2000 (or 2002) period will continue into the future.

The conclusion we draw from these comments is that the most likely outcome is that the observed completion rate over the few years will evolve according to the 'No time trend' columns. As implied by the table, the completion rate of apprentices will tend to increase rather than decrease as the negative effect of the 'other' provider type on completion rates works itself out of the system. In the case of trainees, this effect is much smaller and hence the completion rate is expected to remain constant.

## **CONCLUSIONS & FURTHER ANALYSIS**

The main objective of the study outlined in this paper was to estimate the effect of a set of observable factors on the probability of students completing an apprenticeship or traineeship. In most cases these observable factors are best seen as proxies for the underlying ultimate determinants. That is, gender, age and level of schooling do not affect the probability of completion directly. Rather, persons of a certain gender, age and level of schooling tend to have some common characteristics, preferences and opportunities that lead them to make similar choices. In the case of student factors, identifying what these common characteristics are can be very difficult as the link between what is observable and the underlying determinants is far from obvious. In the case of other factors, there is a more realistic prospect of doing so.

Thus the results of the study indicate that the marginal probabilities of completion vary with a range of employer, provider and industry factors. In the case of apprentices, for example, it is found that the probability of completion is lower for a student with a private provider compared to those with TAFE providers. Similarly, a student employed by a group training company has a lower probability of completion than a student who is directly employed by the training firm, be that in the private or Government sector. Underlying these factors are the recruitment, employment and training practices of employers and providers. In the case of the industry and occupational effects the same underlying factors are at work as well as the nature of the work.

Two prominent questions arise from these findings. The first question is how do the practices of the different providers, employers and industries differ? The second question is: which of these differences account for the effects on the probability of completion that have been found.

Much is already known about what these practices are and their likely effect. Thus the next obvious step would be to collate the information that is already available and relate this to findings in this paper. Most likely this would result in a long list of different practices from which it might be difficult to identify what it is about a specific group of trainers, for example, that lead their apprentices to have lower completion rates. Thus, a second step might be necessary - to complement this information by drawing on the informed opinion of employers, providers and other parties in the vocational education sector.

With respect to industry and occupational groups, we have cautioned against paying too much attention to how the marginal probabilities vary by occupational groups. The prospects of

identifying some underlying factors that account for these occupational group variations do not seem promising. The more modest and realistic aim would be to try to identify the factors common to industries for which the marginal probabilities are low and high. Certain industries are associated with a higher probability of completion and the practices in these industries therefore merit further investigation.

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