



LONGITUDINAL SURVEYS OF AUSTRALIAN YOUTH  
RESEARCH REPORT 56

# Year 12 completion and youth transitions

CHRIS RYAN





NCVER

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**Longitudinal  
Surveys of  
Australian Youth**

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The Longitudinal Surveys of Australian Youth is a research study that follows young Australians as they move from school into further work and study. It provides valuable information to better understand young people's pathways from school and what influences their choices. The analytical and research work of the program is managed by NCVER.

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# About the research



## *Year 12 completion and youth transitions*

Chris Ryan, Australian National University

On average, young people who complete Year 12 tend to have more successful transitions from education to work than those who do not. Hence we have seen numerous governments introduce policies that promote Year 12 completion. However, in recent years there has been a realisation that it does not make much sense to promote Year 12 retention for its own sake. No longer are targets expressed in terms of the numbers completing Year 12; now the targets are in terms of Year 12 or its equivalent.

While this policy trend makes good sense, is it going to have the desired outcomes? The aim of Ryan's study is to answer this question by looking at data from the Longitudinal Surveys of Australian Youth (LSAY). This is not a straightforward task. The fact that some students benefit from doing Year 12 does not prove that all students would benefit from undertaking Year 12. In addition there is the problem of sample attrition, with the less successful individuals more inclined to drop out of the survey.

Ryan employs a range of econometric techniques to account for these difficulties, focusing on those who do not complete Year 12 and continue on to further full-time tertiary education study. He defines a set of education pathways according to whether the individual is an early school leaver or not and whether the individual undertakes further education and training (including apprenticeships and traineeships). He also rates success through a number of outcomes; these include a number of labour market and study variables over the transition years.

## Key messages

- ✧ For males, Year 12 completion provides a better transition relative to other pathways, the exception being an apprenticeship. However, the superiority of an apprenticeship is conditional on obtaining one. Obtaining the type of certificate II or III available to young people in these data was not as effective on average as completing Year 12.
- ✧ For females, completing Year 12 clearly provides the best outcomes, followed by the completion of a traineeship, and the completion of an apprenticeship (female apprentices tend to be either hairdressers or cooks). Of the other pathways, completing a certificate III is the best and completing a certificate II the worst.
- ✧ Sample attrition does not materially affect the analysis.

On the whole Ryan's study supports the push toward Year 12 completion, even for those not following a path into full-time tertiary study. This suggests that we need to devote further effort to devising and building on new models of schooling that engage young people, especially those more attuned to applied than to academic learning.

Tom Karmel  
Managing Director, NCVER



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# Executive summary

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To fulfil both labour market and social imperatives, national and state youth policy is focused on ensuring that young people make effective transitions from school. One mechanism promoted by Australian governments has been to encourage a higher proportion of young people to complete Year 12 or an equivalent qualification, the latter principally envisaged as a vocational alternative. Understanding which post-compulsory education pathways suit particular young people is an important step in the design of policies and programs for this group. The main post-compulsory schooling options available to young people include: remaining at school to complete Year 12, with later university studies or vocational education and training (VET); earlier school leaving, with participation in vocational education and training (some of which could be considered equivalent to Year 12 or higher); and earlier school leaving without further participation in post-compulsory education and training.

This report provides an assessment of the contribution of Year 12 completion to the better labour market outcomes achieved by individuals who complete it. It also aims to assess the benefits provided by those vocational qualifications viewed as being the equivalent of Year 12 completion. In undertaking these assessments, the report utilises data from the Longitudinal Surveys of Australian Youth (LSAY) cohorts of students initially in Year 9 in 1995 (Y95) and 1998 (Y98). In Y95, these outcomes are studied after Year 12 completion between 1999 and 2006; in Y98, these outcomes are studied between 2002 and 2007. The results therefore relate specifically to the experiences and conditions faced by young people in these data between 1999 and 2007. VET provision has changed in Australia since the young people analysed here undertook their courses, as indeed has schooling. Hence, the results may not be the same as those achieved by the current set of young people who complete the same named qualification levels, or those who choose new transition paths that were not previously available. However, it was necessary to use data in which the outcomes of young people were actually observed, which is the strength of the Y95 and Y98 data.

The set of outcome measures studied in the paper includes: being in full-time employment; being in a full-time activity (that is, either full-time employment or full-time study); being in unemployment; current wages and earnings; and the occupation in which individuals are employed (its skill or status level).

The analysis in this study excludes individuals who proceed to full-time university study or full-time courses at VET institutions within two years of completing Year 12. There are three reasons for this. First, the outcomes of such individuals are not captured entirely within the timeframe used for this study. Second, most interest lies in estimating the impact of completion of Year 12 for those whose decisions to undertake Year 12 are 'marginal', not those students most likely to proceed to university because of their academic achievement and family backgrounds. Third, such individuals have the potential to confound the Year 12 effect estimates, since their outcomes will incorporate both the effect of their time studying and subsequently through any effects that completion of their new qualifications might have on their outcomes.

Estimates using regression analysis are provided of the impact of completion of Year 12 on a number of labour market outcomes. Separate identifiers are included in the regression equations for Year 12 completion, for apprenticeships and traineeships and for other VET certificate level II and III qualifications (based on the classification individuals self-report of the level of VET

course they commence and complete) as a means of identifying the benefits of completing these 'equivalent' courses.

Rather than relying on just one strategy to identify the causal effects of Year 12 or its vocational equivalent, a number of alternative strategies have been adopted here to achieve this; these have demonstrated that the estimates are robust to alternative methods of estimation and to attrition from the surveys.

## Findings

The results of the analysis in this report point to widespread, but modest, effects from the completion of Year 12 among young Australians who do not proceed immediately from Year 12 to further studies. These effects include better full-time employment rates, lower incidence of unemployment, higher wages and higher-status jobs. The effects seem not to be related to the specific characteristics of individuals, except that they are more pronounced for females than for males and are more evident in data from the Y95 cohort than the Y98 cohort. Across the wage and occupation outcomes, there is less difference between the genders and no change in Year 12 effects between cohorts.

The data also point to benefits of a similar magnitude from completing an apprenticeship for males and a traineeship for females. This result contrasts with earlier studies, which have tended to find that VET qualifications have provided greater benefits to males than females. However, these studies were largely conducted at a time when the numbers of traditional apprenticeships were far higher than the numbers of traineeships. It may now be the case that traineeships have become a more widely accepted and valued qualification than was previously the case and this appears to have benefited females.

The data do not show the same kind of benefits from completing VET qualifications at certificate levels II or III. In whatever way these certificates may be equivalent to Year 12, they do not appear to be equivalent to Year 12 in terms of their impact on outcomes for young people early in their working lives. Their outcomes were no better, and in some case appeared worse, than early school leavers who had not undertaken any post-school qualifications. Part of this may reflect that these qualifications provide benefits down the track, while young people may be enticed into early school leaving because they have already lined up an immediate job. There is some modest evidence that these qualifications may, indeed, provide some benefits in some outcomes over the longer-term, but they are nothing like the consistent and widespread benefits provided by completion of the other qualifications considered here.

This finding highlights the need for investigation into the precise equivalence between vocational and academic qualifications beyond investigation of equivalence in outcomes. That certificate levels II and III qualifications obtained without contracts of training realise poor outcomes by comparison with Year 12 completion and completion of an apprenticeship or traineeship, which in some instances are equivalent-level qualifications, warrants complementary investigation. This should include an analysis of the content and nature of the qualifications and aspects of the behaviour of individuals or of the acceptance of these qualifications in the community and by employers.

# Introduction

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How does completion of Year 12 affect labour market outcomes? Are there alternative pathways through education and training that set young people up as well? And is one pathway better for some students than for others? To assist young people in achieving their objectives, it is important to know which pathway after compulsory schooling is best for which young people.

The main options for post-compulsory schooling available to young people in Australia include: remaining at school to complete Year 12, potentially in conjunction with later university studies or VET; earlier school leaving, with participation in VET (some of which could be considered equivalent to Year 12 or higher); and earlier school leaving without further participation in post-compulsory education and training. This report examines the Year 12 pathway and potential vocational equivalents to identify the effects of the different post-compulsory education and training options open to young Australians on their later labour market outcomes. The aim of the research is to estimate the ‘causal’ effects of participation in different post-compulsory education and training options on the observed outcomes.

The paper uses data from the Longitudinal Surveys of Australian Youth (LSAY) to study the effect of Year 12 completion on outcomes. It is necessary to use data from cohorts where the outcomes are already clearly apparent, rather than data from more recent cohorts. While data from more recent cohorts reflect contemporary patterns of Year 12 completion and patterns of participation in VET, they do not allow the effects of Year 12 or VET qualification completion on post-school outcomes to be analysed. Therefore, this study uses the LSAY Y95 and Y98 cohorts rather than the more recent Y03 and Y06 cohorts.

For the purposes of this study, completion of Year 12 is taken principally to mean obtaining a Year 12 certificate from the relevant state certification authority. Rather than make assumptions about the appropriate vocational qualification equivalent for Year 12, the outcomes for those who complete traineeships or apprenticeships and certificate level II and III qualifications are also estimated separately. In this way, the comparability of the outcomes achieved by individuals with differing Year 12 completion and vocational qualifications is used to provide an indication of their ‘equivalence’, at least in terms of labour market outcomes.

While there have been numerous previous studies of the impact of Year 12 on individual outcomes, most have not taken these alternative dimensions of completion into account or the potential role of unobserved differences (such as a person’s motivation and attitudes towards their study) between completers and non-completers that may affect observed outcomes. This study aims to do both these things and to provide estimates of the ‘causal’ impact of Year 12 completion on outcomes.

This report also aims to address seriously the potential problems caused by attrition from the LSAY data. Attrition has the potential to bias the estimates of the impact of completion of Year 12 on outcomes, so its potential impact is assessed in a variety of ways.

The remainder of the report is organised in the following way. The next section reviews previous studies that examine the impact of Year 12 effects on labour market outcomes and discusses how these effects should be estimated. The following section contains a description of the LSAY data

and the outcomes considered here; the next section contains the results of the empirical analysis, while a final section concludes the paper.

The results point to widespread, but modest, effects from the completion of Year 12 among young Australians who do not proceed immediately from Year 12 to further studies. These effects include better full-time employment rates, lower incidence of unemployment, higher wages and higher-status jobs. The effects seem not to be related to the specific characteristics of individuals, except that they are more pronounced for females than for males and are more evident in data from the Y95 cohort than the Y98 cohort. The data also point to benefits among males from completing an apprenticeship or among females from completing a traineeship. The data do not show the same kind of labour market benefits from completing VET qualifications at certificate levels II or III.

# The magnitude of Year 12 effects and how to estimate them

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## Previous literature

With some exceptions, analysis using LSAY data has typically shown that individuals who complete Year 12 have better ‘transitions’ to, and later outcomes in, the labour market than those who do not. The results of a number of such studies are summarised in table 1, which identifies some representative studies, the data used in the studies, the outcomes analysed and some idea about the nature of the estimated effects. Year 12 effects that were significantly different from zero are identified, while those effects that were not significant are reported as zeros. The results reported from these studies are representative of those other studies using LSAY data in which the effects have been shown diagrammatically, rather than as numbers reported in tables (Lamb 1997, for example). In general, completion of Year 12 tends to lead to better employment and wage outcomes and less unemployment.

This general picture is not evident in all studies, however. For example, Marks and McMillan (2003) distinguish between early school leavers, late non-completers (those who leave after their Year 11 year) and completers of Year 12. They found that early leavers tend to have quite good outcomes, since many who leave school have found jobs or apprenticeships for themselves. In contrast, it was the late non-completers (those who left at the end of Year 11 or during Year 12) whose outcomes were relatively poor. Marks and Fleming (1998a) also point out that the estimated effects for Year 12 completion on unemployment incidence were larger once they took account of labour market experience. They argue that, if both education and experience contribute to better outcomes, there is something of a trade-off for young people between obtaining a Year 12 certificate and entering the labour market.

Authors using other data tend to find less pronounced Year 12 effects. For example, Wilkins (2008) finds no Year 12 effect in a recent study using data from the Household, Income and Labour Dynamics in Australia (HILDA<sup>1</sup>) Survey to analyse labour market status, including underemployment. Measuring Year 12 effects in most studies is difficult as a consequence of the role of the unobserved factors that influence Year 12 completion and possible differences arising from different completion rates over time.

Furthermore, not all of the studies using LSAY data focus on marginal decision-makers—those for whom the decision to complete Year 12 is a real one, by comparison with others whose achievement levels and social backgrounds meant they were always or never likely to complete Year 12. Inclusion of these people may mean that the estimated effects are not reliable estimates of the benefits from completion for the marginal decision-makers. That is, any apparent Year 12 effects may reflect a number of factors in addition to any ‘causal’ effect of Year 12 on the outcomes. They may reflect differences in unobserved ability, motivation, attitudes and preferences towards education.

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<sup>1</sup> The HILDA survey is a household-based survey that began in 2001. It is conducted by the University of Melbourne’s Institute of Applied Economic and Social Research.

Dockery (2005) addressed the problem of marginal decision-makers directly. His approach was to match individuals who were alike in terms of their observed characteristics, via their probability of completing Year 12, and to assess whether those who completed Year 12 had better wage and employment outcomes than those who did not. Using propensity-score matching, Dockery (2005) found that marginal decision-makers who completed Year 12 (he termed them the non-academically inclined) did not have higher, and may have had lower, wages compared with non-completers. Unemployment may also have been higher among this group of school completers. With the method he used, it seems that these differences in wages outcomes may reflect the combination of a Year 12 effect and a labour market experience effect. Nevertheless, regression analysis which took account of both years of schooling and experience found that returns to schooling were lower among non-academically inclined students than those estimated over the whole LSAY Y95 cohort.

**Table 1 Year 12 completion effects in selected LSAY research reports**

Study	Data set	Outcome variable	Effect size (%)
Marks & Fleming (1998a, table A.4)	YIT61	Unemployment incidence, persons	-0.42
	YIT65	Unemployment incidence, persons	-1.40
	YIT70	Unemployment incidence, persons	-1.43
Marks & Fleming (1998b, table A.4)	YIT61	Wages, persons	0.06
	YIT65	Wages, persons	0.05
	YIT70	Wages, persons	0.04
Lamb, Dwyer & Wyn (2000, table 5.7)	ALS& AYS	Unemployment, females	0.13 – 0.28
	ALS& AYS	Unemployment, males	0–0.16
	ALS& AYS	Employment, females	0.13 – 0.28
	ALS& AYS	Employment, males	0–0.16
Long & Lamb (2002, table 7, table 8)	ALS& AYS	Hourly wages, males	0.08-0.12
	ALS& AYS	Hourly wages, females	0 - 0.06
Marks & McMillan (2003, table 19, table 24, table 26)	Y95	Unemployment incidence	0
		Occupational status	0
		Earnings	0
Marks, Hillman & Beavis (2003, table 12, table 18, table 23)	YIT75	Time working full-time	0.08
		Time unemployed	-0.02
		Time in 'marginal' activities	-0.06

Notes: YIT = Youth in Transition; ALS = Australian Longitudinal Study; AYS = Australian Youth Survey; Y95 = LSAY 1995 Year 9 cohort; numbers after 'YIT' refer to birth cohorts born in the relevant years; for example, YIT61 means the YIT cohort born in 1961. See the LSAY overview paper by the Australian Council for Educational Research (1996) for details on these surveys.

A number of the studies in table 1, along with other studies, have used LSAY data to assess the outcomes achieved by those who complete VET qualifications. These qualifications have not always been well defined in the data collected in LSAY, with uncertainty about the classifications used. With the exception of completion of apprenticeships by young males, studies using LSAY have not found particularly large positive effects from completion of VET qualifications on outcomes for young people (see, for example, Marks & Fleming 1998a, 1998b; Long, McKenzie & Sturman 1996; Lamb, Long & Malley 1998). Further, there is evidence that at least some VET qualification effects diminished as individuals age (Marks & Fleming 1998b).

## Methodology to estimate the Year 12 effects

Like Dockery (2005), the purpose of this study is to try to isolate the 'causal' effect of Year 12 completion on a small set of post-school labour market outcomes. The analysis excludes those

individuals who proceed to full-time university study or full-time courses at VET institutions within two years of completing Year 12. The idea is to exclude from the analysis any estimated impact from completion of Year 12 that would be confounded by the role of other education and training qualifications and also to remove individuals whose high school achievement meant that there was never any question about their completion of Year 12.

The set of outcome measures studied in the paper includes: being in full-time employment; being in a full-time activity (that is, either full-time employment or full-time study); being unemployed; current wages and earnings; and the occupation in which individuals are employed (its skill or status level).

Separate identifiers are included in regression equations for Year 12 completion and for various VET certificate-level qualifications as a means of identifying the benefits of completing those qualifications. This will enable comparison with the estimated Year 12 effects to assess which VET-level qualifications might provide ‘equivalent’ outcomes.

Rather than relying on just one strategy to identify the causal effects of Year 12 or its vocational equivalent, a number of alternative strategies have been adopted. (These are described in more detail in a later section.) First, standard least squares estimates are compared with those from regression equations involving reweighting the data. A number of alternative reweighting strategies are employed—reweighting the early leavers to be more like the Year 12 completers; reweighting the completers to be like the early leavers and so on. Second, like Dockery (2005), propensity-score-related matching approaches are used in generating causal estimates of the impact of Year 12. Both of these approaches involve estimation of the impact of Year 12 (or the relevant VET qualification) by comparing the outcomes of those who complete it with those most like them, in terms of their background characteristics, among the group who did not complete the qualification level. Third, features of state education systems and differences in labour market conditions that generate consistent differences in school completion rates over time (such as age–grade structures, school commencement and leaving rules that result in students reaching the minimum school leaving age in different grades) are exploited. While it was hoped these different strategies could be used to estimate the impact of Year 12 on outcomes, there were two problems with this approach: there were no available instruments for measuring completion of the VET qualifications; and none of the instruments trialled for Year 12 completion had ideal properties.<sup>2</sup> Nevertheless, it was possible to estimate a variant of the ‘instrumental variables’ (IV) approach for at least the impact of completing Year 12, and the results from doing so are discussed in the results section.

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<sup>2</sup> This ‘instrumental variables’ approach in this context involves the use of other factors (or ‘instruments’) that affect the outcomes of interest only through their effect on Year 12 completion.

# Data and descriptive statistics

## Sample sizes

As noted earlier, data used in this report are from the Y95 and Y98 cohorts of the Longitudinal Surveys of Australian Youth. The young people in the cohorts were in Year 9 when first surveyed in 1995 (that is, Y95) and 1998 (Y98). The Y95 cohort was followed to 2006, while this paper uses responses for the Y98 cohort up until 2007.

The young people were typically observed in Year 12 at school in the fourth wave of the respective data collections, while their receipt of a certificate and whether they received an ENTER score were surveyed in the fifth wave. They were then followed for a further seven waves for the Y95 cohort, and for five waves in the data used for Y98. This means the outcomes of individuals are observed for up to seven years after leaving school upon completion of Year 12, or for a slightly longer period if they were early school leavers.

Among the problems that need to be addressed in an analysis of the impact of Year 12 completion are those posed by attrition. One issue is that some individuals leave the sample before their Year 12 completion or non-completion is observed. A second issue is that individuals whose Year 12 completion is observed may leave the sample, so that their outcomes are not observed. Since both forms of attrition are unlikely to be random, this may produce biases in the results. A later section provides an indication of how attrition may have affected the main results on the impact of Year 12 completion. At this point, the impact of attrition on the number of observations utilised in the analysis is summarised. Key features of the samples used here are summarised in table 2, which shows unweighted numbers of observations at differing times in the collections' histories.

**Table 2 Sample attrition and Year 12 completion in the Y95 and Y98 cohorts**

Activity	Y95		Y98	
	Number	%	Number	%
Original sample size	13 613	100.0	14 117	100.0
Attrition prior to calendar year after year of potential Year 12 study	4 830	35.5	6 355	45.0
Observed in calendar year after year of potential Year 12 study	8 783	64.5	7 762	55.0
Did not undertake Year 12	1 411	10.4	1 032	7.3
Undertook Year 12	7 372	54.2	6 730	47.7
Did not receive a Year 12 certificate	568	4.2	470	3.3
Received a Year 12 certificate	6 804	50.0	6 260	44.3
Commenced university (% share of those with certificate)	3 145	46.2	3 069	49.0
Commenced VET full-time (% share of those with certificate)	1 268	18.6	755	12.1
Sample of non-Year 12 completers or completers not undertaking immediate further study	4 370	32.1	3 938	27.9
Attrition after calendar year of potential Year 12 study	2 740	20.1	2 189	15.5
Continuation in survey to final year analysed	1 630	12.0	1 749	12.4
Received a Year 12 certificate	992	7.3	1 127	8.0
No Year 12 certificate	638	4.7	622	4.4

Source: Estimated from LSAY Y95 and Y98 cohorts, based on unweighted data.



For both cohorts, the initial sample size was around 14 000 Year 9 students. By the fifth wave in each cohort, there had been substantial attrition—of the order of 35% in the Y95 cohort and 45% in Y98. Most students remaining in the surveys undertook Year 12 and most of them completed it successfully, as evidenced by their receipt of a certificate.<sup>3</sup> More than half of the Year 12 completers who received a certificate then proceeded to university or full-time VET study within two years of Year 12. As highlighted earlier, these students are not included in the sample analysed in the remainder of the paper.

This leaves a sample of around 4000 individuals whose outcomes might be analysed for each cohort. However, further attrition in the collection leaves around 40% of this sample remaining in the last year of the data analysed (a slightly higher proportion in the weighted data). In the analysis in the next subsection and later in the paper, however, to maximise the number of observations data are pooled across all years rather than using their response in a single year. This increases the number of observations available to estimate the relevant effects, since the outcomes in all years will reflect the effects, if any, of Year 12 completion; it also allows us to estimate the paths followed by the outcome variables as the years since completion of Year 12 increase. The number of pooled observations for the various outcomes used here are summarised in table 3, but pooling observations means that there are about 21 000 data points used for the analysis of most outcomes for Y95, with 16 000 for Y98 (substantive aspects of the table are discussed further below).

## Average background characteristics of the groups

Table 4 contains the means of the key background characteristics of individuals in the two cohorts for three groups: those who did not complete Year 12 or obtain a Year 12 certificate; those who did and did not proceed to further study within two years of completion of Year 12; and those who did move to further study. The last group are not studied in the paper, but are included here for comparative purposes. These are individuals who proceed to full-time study at university or VET institutions within two years of completing Year 12.

As already explained, completion of Year 12 is defined to mean survey respondents who indicated that they had obtained a Year 12 certificate from the relevant state certification authority. Those people who undertook Year 12 but did not report that they received a certificate are treated as not having completed Year 12. They are included among the first group, along with those who left before Year 12. This first group also includes most of the individuals who, as indicated in the data, undertake VET certificates and apprenticeships. As already noted, VET qualifications have not always been well defined in the data collected in LSAY. This changed with the adoption of the Australian Qualifications Framework (AQF), which now frames the way respondents are asked to categorise the education and training courses they are presently undertaking and eventually complete or not. Note that respondents themselves indicate the level of the VET course they are undertaking and whether it is an apprenticeship or traineeship. The AQF was established part-way through collection of the Y95 data, so there were years where participation in and completion of qualifications were coded to other classifications for that cohort. Data collection for the Y98 cohort began after the AQF was established, so is not affected by this issue. While there were questions in later years that asked respondents to recall qualifications completed in earlier years in terms of the AQF classification, it remains the case that VET certificate-level qualifications are probably captured better in the Y98 cohort than in the Y95 cohort. The extent to which this might have had an impact on our results for the VET-level qualifications is assessed below.

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<sup>3</sup> The presentation of the unweighted data in table 1 overstates the extent to which the young people undertook and completed Year 12, since attrition is more common among those with lower levels of educational attainment in the data.

**Table 3 Average outcomes by receipt of Year 12 certificate in the Y95 and Y98 cohorts: pooled data across all waves after the calendar year the cohort undertook Year 12**

	No Year 12 certificate	Year 12 certificate: no immediate further study
<b>Y95 (outcomes measured 1999 to 2006)</b>		
Employed full-time (%)	61.7	64.9
Full-time activity (%)	64.3	68.3
Proportion unemployed (%)	9.5	5.4
Studying (%)	5.4	7.7
Weekly earnings (\$) (among those employed)	435	413
Weekly earnings among full-time workers (\$)	482	467
Hourly wages (\$) (among those employed)	11.7	11.7
Occupation (ANU3 scaled from 0 to 100)	24.2	26.8
Employed or not observations	9 088	12 287
Full-time earnings observations	4 642	6 864
Earnings observations	5 979	9 304
Occupation observations	7 248	10 934
<b>Y98 (outcomes measured 2002 to 2007)</b>		
Employed full-time (%)	62.2	58.3
Full-time activity (%)	67.0	62.9
Proportion unemployed (%)	8.4	6.8
Studying (%)	6.6	7.9
Weekly earnings (\$) (among those employed)	456	418
Weekly earnings among full-time workers (\$)	509	491
Hourly wages (\$) (among those employed)	12.6	12.5
Occupation (ANU3 scaled from 0 to 100) <sup>(a)</sup>	25.9	28.5
Employed or not observations	5 950	10 114
Full-time earnings observations	3 146	5 198
Earnings observations	4 165	7 683
Occupation observations	4 881	8 855

Note: (a) For Y98 the occupation variable excludes the 2006 and 2007 observations. The occupation variable was coded using a different occupational classification in those years, one for which there is no ANU3 translation.

Source: Estimated from LSAY Y95 and Y98 cohorts, based on weighted data.

The table exhibits a number of features evident in analyses of educational attainment. In both cohorts, attainment is positively correlated with earlier school achievement; family background in the form of parental employment, occupation-based socioeconomic (SES) measures and education; and the neighbourhoods where young people live, and is higher among females than males and those living in metropolitan areas by comparison with rural ones. Attainment is lower among those from Indigenous backgrounds, those with more siblings and those who attended government schools compared with Catholic and independent schools.

**Table 4 Characteristics of individuals by receipt of Year 12 certificate and further study status in the Y95 and Y98 cohorts**

		<b>Year 12 certificate:</b>	<b>Year 12 certificate:</b>
	No Year 12 certificate	No immediate further study	Further study
<b>Y95</b>			
Male	60.3	51.7	42.5
Achievement	46.0	48.8	52.7
Parental occupational SES in Year 11	28.8	33.2	39.7
Father had job in student's Year 11	67.2	76.3	78.9
Father with degree	7.1	11.3	26.2
Mother with degree	7.8	12.0	23.3
Siblings	2.3	2.1	2.0
Born overseas, English speaking	2.5	2.7	2.8
Born overseas, non-English speaking	2.0	2.9	11.4
Metropolitan school	41.9	51.9	62.0
Indigenous background	5.1	2.0	1.1
Rank of postcode wealth-based income (0–100)	40.5	46.1	52.3
Attended Catholic school	10.8	18.7	24.3
Attended independent school	6.0	8.4	16.1
Average parental occupation-based SES of school	31.7	33.6	37.6
<b>Y98</b>			
Male	59.8	56.1	44.4
Achievement	45.4	48.7	53.3
Parental occupational SES in Year 11	31.2	34.0	40.0
Father had job in student's Year 11	67.7	76.2	80.2
Father with degree	10.6	15.2	30.6
Mother with degree	10.9	13.7	28.0
Siblings	2.3	2.2	2.0
Born overseas, English speaking	2.2	2.1	2.5
Born overseas, non-English speaking	3.7	4.2	10.4
Metropolitan school	44.1	48.8	60.4
Indigenous background	4.5	1.9	1.1
Rank of postcode wealth-based income (0–100)	37.2	42.6	48.9
Attended Catholic school	12.9	18.7	24.0
Attended independent school	6.4	8.7	16.9
Average parental occupation-based SES of school	32.9	34.3	37.9

Source: Estimated from LSAY Y95 and Y98 cohorts, based on weighted data.

## Outcome measures

This study involves the comparison of a narrow set of outcome measures among groups, according to whether or not they completed Year 12. These outcomes are measured at the point when respondents in the surveys were interviewed. The set of outcomes are defined as follows:

- ✧ whether, at the time they were interviewed each year, the individual usually worked more than 35 hours each week in their only or main job (*employed full-time*)

- ✧ whether, at the time they were interviewed each year, the individual either had a job in which they usually worked more than 35 hours each week or were full-time students in a VET course or at university (*full-time time activity*)
- ✧ the proportion of the cohort, at the time they were interviewed each year, who had been looking for work in the previous four weeks and would have been available to start work in the week preceding the interview (*proportion unemployed*)
- ✧ the average gross weekly earnings usually earned by those employed (*weekly earnings*). This does not include the business earnings of the self-employed. Gross weekly earnings are expressed in real terms, in 2007 dollars
- ✧ the average gross weekly earnings usually earned by those employed for 35 or more hours per week in their only or main job (*weekly earnings among full-time workers*). Again, this does not include the business earnings of the self-employed. Wages are expressed in real terms, in 2007 dollars)
- ✧ the average gross hourly wages of employees, calculated as their gross weekly earnings divided by the number of hours they typically worked (*hourly wages*). Where either earnings or hours are missing, the estimated hourly wages are also missing (does not include the business earnings of the self-employed. Wages are expressed in real terms, in 2007 dollars)
- ✧ the value of the four-digit occupation the individual reported working in at the time they were interviewed each year, according to the ANU3 occupational status scale. The reported occupations do include the reports by the self-employed
- ✧ whether or not, at the time of the survey each year, the individual reported they were studying in an educational or training course.

The average values for each of these outcome measures for early leavers and for the group who obtained a Year 12 certificate and did not proceed to further full-time study in the two years after completing Year 12 are shown for both cohorts in table 3. The average outcomes are measured from data pooled across all available years using weights calculated to take account of the survey design (initial respondent selection probabilities vary by jurisdictions and school types) and to redress problems associated with sample attrition.<sup>4</sup>

In the data for Y95, the outcomes of the group who completed Year 12 tend to be better than those of groups who did not. Their full-time employment, full-time activity, study participation rates and the proportion unemployed are all better than the group without a Year 12 certificate. They also tend to work in higher-status occupations, although their earnings and wages do not appear to be better than the group without a Year 12 certificate. For those early school leavers with jobs, their additional labour market experience, compared with Year 12 completers, may offset any negative wage effect from their lower schooling at this early stage of their careers, a factor that can be addressed in the regression equations described later in the report.

The superior outcomes associated with Year 12 completion are less evident for the Y98 cohort, but this is not only because they are followed for a shorter period of time in the data. If the analysis of the Y95 cohort is limited to the same shorter period, so that only the outcomes in that cohort between 1999 and 2004 are analysed, the pattern in table 3 of superior outcomes associated with Year 12 completion for Y95 is broadly replicated. Other factors must be responsible for the different pattern for Y98. One candidate is that the labour market conditions faced by school leavers in the Y98 cohort were substantially better than those faced by the Y95 cohort, which may have reduced the penalty for non-completion of Year 12 for this cohort. Other factors also stand in the way of the comparison between Year 12 completers and non-completers. For example, while individuals who proceed directly to further study after leaving school are excluded, individuals who

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<sup>4</sup> See Marks and Long (1998) for a description of the weighting methodology used for the Y95 cohort. A similar approach is used to generate the weights for the Y98 cohort.

may return to study after the initial transition period are included. This may affect the full-time employment and earnings outcomes of the Year 12 completion group more than non-completers.

On the face of it, among those who do not proceed to further study soon after leaving school, the early career benefits of Year 12 completion demonstrated in table 3 appear to be quite modest. Since table 4 indicated that the group of Year 12 completers comes from higher socioeconomic status backgrounds than non-completers, it seems unlikely that these estimated benefits would get much larger as the other characteristics of individuals are taken into account. Other activities that young people engage in, such as further study, may exert more of an impact. The regression analysis that follows is designed to take account of these demographic characteristics and other factors that might get in the way of making a proper comparison of the differences in the outcomes between the two groups.

## Summary

The two cohorts from the LSAY series used here are subject to substantial attrition and this needs to be taken into account in our assessment of the impact of completion of Year 12 on subsequent outcomes. The background characteristics of the two groups largely reflect the typical educational attainment differences in the groups, with those who completed Year 12 having higher average levels of achievement and coming from higher socioeconomic status backgrounds. The average outcomes achieved by the group who completed Year 12 are not much better than the group who did not complete Year 12, although regression analysis that takes account of the impact of other factors on the outcomes is necessary to isolate the impact of Year 12 satisfactorily.

# Estimated Year 12 effects on outcomes

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This section focuses on results from regression analysis of a number of important outcome measures for individuals, according to a set of background characteristics. Among these characteristics is an indicator variable for whether or not individuals completed Year 12, that is, they obtained a Year 12 certificate from their relevant state authority. In terms of the main focus of this paper, this is the key variable. Other types of analyses are also described in this section, the aim of these being to assess the robustness of the magnitude of the main Year 12 effects reported. These alternative analyses involve generating different types of comparisons from the regression analysis, as well as highlighting results where account is taken of the potential impact of attrition. The methodology is described briefly in the first subsection, the Year 12 regression results in the second, the VET qualifications results in the third subsection and the results of the various robustness checks in the last.

## Methodology

The principal analytical technique utilised in this report involves regression analysis of the determinants of the outcome variables introduced in the previous section. In all cases, least squares regression estimates are presented, with clustered standard errors reported that incorporate the multiple observations on individuals used in the data.

The purpose of the regression equations is to estimate the impact of completion of a Year 12 certificate, or the possession of a VET qualification as an alternative, on the outcomes achieved by individuals. Individuals who proceed from school to university or full-time VET studies in the first two years after completing Year 12 are excluded from the analysis. This does not mean, however, that the young people being examined here do not have the chance to complete post-school qualifications; they have up to seven years to undertake further studies and may also study part-time. Hence, other indicator variables are included in the regression equations for whether individuals complete a VET certificate-level qualification or an apprenticeship or traineeship.

Other explanatory variables used in the equations include the gender of individuals (results where the equations are estimated separately for males and females are also reported below); the years since they left school; their Year 9 level of school achievement; measures of social background (parental employment, education and occupation variables, as well as the Tax Office non-labour income ranking of the postcode where they live); the country of birth of the individual and whether it was English-speaking; the number of siblings; the type of school they went to; and the state in which they originally lived. The regression equations are of the form

$$(1) \quad y_i = X_i' \beta + Q_i' \lambda + \delta Yr12_i + u_i$$

where the  $y_i$  are the outcome variables,  $Yr12$  is the Year 12 certificate indicator, the  $Q_i$  are indicators of any post-school qualifications completed by individuals<sup>5</sup> and the  $X_i$  are the other background characteristics of individuals (see the list in table 4) and  $\beta$ ,  $\lambda$  and  $\delta$  are parameters or parameter vectors. The main interest in this paper is on the magnitudes of the parameter on the Year 12 certificate indicator  $\delta$  and the VET qualification parameters  $\lambda$ . In estimation, these parameters will be allowed to vary across groups of individuals through the use of interaction terms, reflecting the possibility that the qualifications may have differing effects across the population.

The initial set of regression results are based on unweighted data since the list of included variables incorporates the key factors on which the LSAY cohort samples were designed (they were stratified by state and school sector). This equation is estimated for each cohort separately, for each gender separately and with various alternative weighting schemes employed.

Initially, the Year 12 certificate indicator is treated as though it is an exogenous variable. This may not be a satisfactory approach, since there may be differences in the characteristics of those who complete Year 12 that are not observed which may also contribute to their outcomes. This may lead to wrongly ascribing the impact of these unobserved factors to the Year 12 effect. There are a number of approaches to dealing with this issue. One is to estimate equation (1) by ‘instrumental variables’, where the existence of other factors (or ‘instruments’) that affect completion of Year 12, but not the outcome variables directly, are exploited. Suitable instruments are often difficult to find and that proved to be the case in this instance. While there were a number of potential candidates, including differences in school structures and commencement arrangements across Australian jurisdictions that affected the age of students in Year 9, as well as differential labour market conditions, none of the instruments was entirely satisfactory. None had satisfactory properties across all outcome variables (they failed over-identification tests; see Wooldridge 2000) and some that clearly had an impact on Year 12 completion led to extraordinarily large Year 12 estimated effects.

Rather than rely on unsatisfactory instruments or those that led to implausibly large Year 12 effects, the approach adopted here is to use matching procedures and related regression reweighting to obtain ‘causal’ estimates of the Year 12 effect from observational data.

These techniques involve estimation of a first-stage equation of whether or not individuals completed Year 12, an equation of the form:

$$(2) \quad \text{Prob}(Yr12_i=1) = X_i' \pi + W_i' \gamma + v_i$$

where the  $W_i$  are a set of other variables that determine whether individuals complete Year 12 and  $\pi$  and  $\gamma$  are parameter vectors. The variables in  $W_i$  include: student intentions collected in Year 9 on whether they intended to complete Year 12; intentions to go to university; school characteristics, including average parental socioeconomic status measures (parental occupational ANU3 scores); the proportion in the school in Year 9 who planned to complete Year 12 and (separately) to attend university; and some other features that reflect the school systems of the differing jurisdictions. These include the grade in which the young people turned 15 years old; the proportion of young students aged 12 years in Year 8 in the cohort; and the proportion of each Year 12 cohort who proceeded to university in the various jurisdictions.

Equation (2) is estimated in this paper by probit analysis. The regression parameters are used to estimate the probability or propensity score,  $P_{12i}$ , for each individual of completing Year 12. This propensity score is used in two ways in this paper. The first is to match individuals who completed Year 12 with those most like them in the group who did not, in terms of their values of  $P_{12i}$ , and to

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<sup>5</sup> These can be qualifications completed at any time by those without Year 12, or by those who did complete Year 12 but undertook their subsequent VET qualifications part-time or commenced them more than two years after completing Year 12.

compare their outcomes. This gives an estimate of the ‘treatment on the treated’. An alternative would be to match those who did not complete Year 12 with those most like them who did and compare their outcomes. This gives us an estimate of how much the treatment could have benefited those who did not undertake it, known as the ‘treatment on the untreated’ effect. Various forms of propensity-score matching are available that make the necessary comparisons between treatment and untreated groups, in this case, Year 12 completers and non-completers. Matching techniques are summarised in Angrist and Krueger (1999), Blundell and Costas-Dias (2000, 2009), Heckman, Ichimura and Todd (1997) and Heckman, LaLonde and Smith (1999).

In this paper people are not simply matched according to their propensity score of completing Year 12, even among the group who do not proceed after school to full-time study. It seems important to take into account their gender, the LSAY cohort they were in, the calendar year and whether they had completed post-school qualifications in the form of an apprenticeship or traineeship or certificate II or III. Hence, the matching is conducted within cells defined by these variables and match on the propensity score of individuals and the length of time since they had left school. This matching is conducted only over cells in which there were at least 100 observations. This removed 1936 observations in small cells out of 36 415 total observations. Since the matching is on two variables within cells, it is undertaken via one-to-one Mahalanobis matching (see Sianesi 2008, for example).

A second approach to estimating these parameters is to conduct regression analysis with reweighted data. The ‘treatment on the treated’ effect can be estimated by reweighting all non-completers by the weights  $[P_{12i}/(1 - P_{12i})]$  (treated observations retain a weight of unity) and the ‘treatment on the untreated’ effect by reweighting all completers by the weights  $[(1 - P_{12i})/P_{12i}]$  (Hirano, Imbens & Ridder 2003; Brunell & DeNardo 2004; Nicholls 2008, 2009). This reweighting approach means that the estimate of the impact of Year 12 (or the relevant VET qualification) on outcomes is derived giving greatest emphasis to comparisons of those most alike in terms of their background characteristics and ambitions in the completion and non-completion groups and less weight to those whose characteristics differ. In this paper, these various Year 12 parameters estimated by both regression reweighting and propensity-score matching methods are reported.

Both of these methods involve the assumption that the set of controls or observed characteristics of individuals are extensive enough, such that, conditional on these factors, the distribution of outcomes is independent of assignment to treatment (the *conditional independence* or *ignorable treatment* assumption), in this case, whether individuals completed Year 12 or not. Essentially, our set of  $X$  and  $W$  variables influences the outcomes of interest to the extent that there are no unobserved factors that influence the outcomes indirectly through the decision to complete Year 12 (such as *selection* effects, for example).

If this assumption holds, the resulting estimates can be given a causal interpretation. Unfortunately, this is an assumption that cannot be tested. In this case, however, the range of variables at our disposal provides some good reasons for arguing why it might hold. First a measure of school achievement is available in the data, collected at an earlier point in the young people’s lives, while they were in Year 9. Second, there is an extensive set of background characteristics available, including parental education and occupation and measures of the socioeconomic status of the area where they live. Third, measures of students’ intentions to complete Year 12 are available, as well as whether they intend to go to university after completing their schooling, which requires completion of Year 12. Many unobserved factors that might impact on people’s decisions will also affect their plans. For example, young people who are particularly motivated towards their schooling may have better outcomes in the future because of this motivation, but they are also likely to have educational plans that reflect this high motivation. In this case, such motivation is captured through the plans that people report. Fourth, there is a measure of students’ assessment of their school performance relative to their peers, from which the effect of the students’ own school achievement and their school’s average achievement is removed. This variable is interpreted as a measure of self-



confidence, which might affect both education choices and outcomes. Finally, information is included about the plans and social backgrounds of other individuals at the schools that the young people attend, since school effects are another potential source of variation in the choices made by individuals and the outcomes they experience. In light of the good-quality data and the robustness of the results presented below to various alternative specifications, there are good grounds for giving the estimates presented a causal interpretation.

## Estimated Year 12 effects

The Year 12 effects reported in this paper are the estimates on the Year 12 variable in regression equations. They should be interpreted as measuring the impact of completion of Year 12 on the outcome variable, once all of the other variables included in the equation have been taken into account. That is, they are estimates of the impact of completing Year 12 on an individual, given their level of school achievement, the number of years since leaving school, their social background, and all other observed characteristics. They are estimates of the effect of completing Year 12 relative to the group who did not complete Year 12 and completed no subsequent VET qualification. For most of the outcome variables, the estimates are of the change in the probability of the outcome equalling one because an individual completed Year 12. For the wage-related variables, the estimated effects are of the percentage wage increase because an individual completed Year 12.

With eight outcome variables, two cohorts and two genders to analyse with a number of different estimators, a host of explanatory variables, and a number of educational attainment levels of interest, there are too many ‘results’ for them all to be presented. Instead, the focus is first on summarising the estimated Year 12 effects and presenting the full results for only a few important and representative outcomes. The Year 12 effects are presented in a series of tables, where the results are shown for all outcome variables for different estimators. The estimated VET effects are presented and discussed in a later subsection.

Specifically, table 5 contains the least squares Year 12 effect estimates from regression equations for all outcome variables for males and females for each cohort.

The estimated Year 12 effects when all parameters were allowed to vary between the cohorts are presented in appendix table A.1. Table A.3 in the appendix contains the ‘treatment on the treated’ and ‘treatment on the non-treated’ Year 12 estimates obtained from reweighted regressions using propensity scores for males and females using data pooled over both cohorts, but with the Year 12 effects allowed to differ between cohorts. The first-stage Year 12 completion equation is presented in appendix table A.2, with both least squares and probit estimates presented. Appendix table A.4 contains estimates of these same parameters obtained from propensity-score matching for males and females in each cohort.

In general, from table 5, the results point to positive effects from completion of Year 12 across most outcomes. They are of the order of a ten-percentage-point increase in full-time employment rates in females in Y95, a three-percentage-point decrease in the incidence of unemployment and a five per cent increase in hourly wages. There are also positive effects on the proportion in full-time activities for females and on occupational status and other wage measures. There appear to be no positive effects on the propensity to undertake further study. The positive Year 12 effects are typically more pronounced for females than for males, especially in the participation-type variables (full-time employment, full-time activity, unemployment and study). The estimated effects are modest in aggregate, with there being differences of the same magnitude between Australian jurisdictions.

From table 5 there are larger estimated Year 12 effects in Y95 than in Y98, although the estimated female effects seem quite strong in both cohorts compared with males, with the exception of the wage effects, where they tend to be pronounced for males in both cohorts.

The broad magnitude of these Year 12 effects tend to be confirmed in the treatment on the treated and on the non-treated, estimated either via regression reweighting and reported in appendix table A.3 or via propensity-score matching in appendix table A.4.<sup>6</sup> These estimates also tend to confirm that the Year 12 effects were larger for females than for males and were larger in Y95 than Y98, although there are some departures from this picture in the propensity-score estimates, including some estimated negative wage and study propensity effects.<sup>7</sup>

**Table 5 Estimated Year 12 completion effects: least squares estimates, Y95 and Y98 cohorts**

	Y95		Y98	
	Females	Males	Females	Males
Employed full-time (% points)	0.115*** (0.019)	0.015 (0.015)	0.080*** (0.021)	-0.037* (0.017)
Full-time activity (% points)	0.107*** (0.019)	0.001 (0.014)	0.041** (0.020)	-0.043*** (0.015)
Proportion unemployed (% points)	-0.035*** (0.007)	-0.036*** (0.007)	-0.043*** (0.009)	-0.002 (0.008)
Weekly earnings (%)	0.078*** (0.025)	0.017 (0.018)	0.078*** (0.025)	-0.004 (0.021)
Weekly earnings among full-time workers (%)	0.030** (0.015)	0.032** (0.014)	0.085*** (0.015)	0.038** (0.015)
Hourly wages (%)	0.037*** (0.014)	0.054*** (0.012)	0.058*** (0.014)	0.048*** (0.015)
Occupation (ANU3 scaled from 0 to 100)	1.524** (0.485)	2.844*** (0.535)	2.498*** (0.512)	2.915*** (0.543)
Studying (% points)	0.006 (0.010)	-0.002 (0.008)	-0.034** (0.013)	0.006 (0.009)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

Interaction terms of Year 12 by achievement, parental occupational socioeconomic status and attendance at a metropolitan school were added to the basic least squares specification to assess the extent to which there were differences in the impact of completion of Year 12 across individuals. The results indicated that, beyond the important differences in the impact of Year 12 by gender and cohort, few of the other effects were important. The metropolitan interaction suggested that individuals from metropolitan areas had a slightly lower probability of finding a full-time job, but higher hourly wages, while higher-achievement individuals who completed Year 12 may have earned slightly lower hourly wages. In general, except for the gender and cohort differences already mentioned, the results within genders did not appear to vary much between groups defined by other observed characteristics. Estimates with interactions between other variables are described in more detail below.

While instrumental variable estimation per se provided implausible values for the estimated Year 12 effects, it is possible to adopt the ‘dummy endogenous variable’ approach described in Vella and Verbeek (1999) and implement the estimator by inserting a predicted probability from a first-stage

<sup>6</sup> The matching results were estimated using the *psmatch2* stata program of Leuven and Sianesi (2003).

<sup>7</sup> The propensity-score approach tended to deliver larger treatment on the treated Year 12 effects than the treatment on the non-treated estimates. The estimates from the propensity-score-based treatment on the treated were much closer to the reweighted estimates when the matching took place solely on the propensity score (not reported) than the propensity score and the years since leaving school. The treatment on the non-treated effects remained smaller when the matching took place only on the propensity score.

equation explaining the Year 12 completion decision using the set of ‘instruments’ and a set of appropriate explanatory variables. Hence, for example, the years-since-school variable, which is so closely correlated with Year 12 completion, is excluded. Where this is done, the estimated Year 12 effects are typically of the same sign and larger than the least squares estimates, a common outcome of IV estimation. For example, the decline in unemployment arising from Year 12 completion is estimated to be 5.3%, by comparison with 3% in the least squares estimates, while the increase in hourly wages was 15% compared with less than 5%. The estimated effects were larger for females than males. There was one exception to this picture of consistent, but larger, effects. The estimated Year 12 effect on full-time employment incidence was negative. Given the uncertainties about the instruments in this context, it seems preferable to rely on the least squares and reweighted estimates as giving the more plausible set of Year 12 estimates across outcomes.

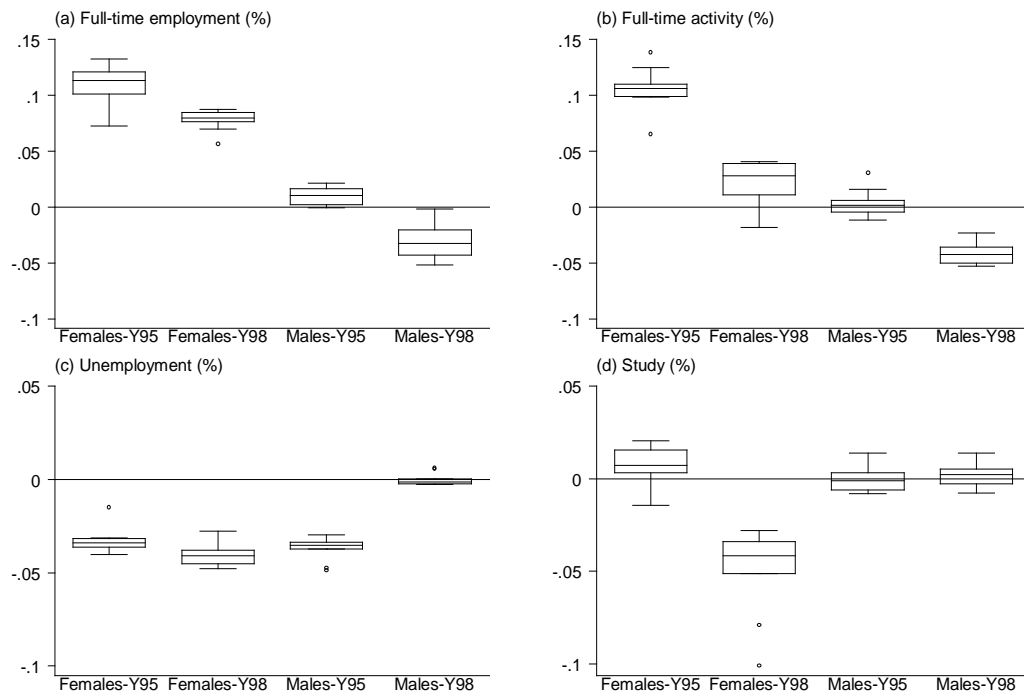
A summary of the various estimated Year 12 effects across the alternative regression-based estimators is provided in figures 1 and 2. They show the range of estimated Year 12 effects for each outcome variable for males and females in each cohort. The effects for participation activities are shown in figure 1 and the earnings/wage outcomes and occupational effects in figure 2. The figures are intended to provide a graphical picture of the range of estimated effects presented in this section, as well as those of a later section that aims to incorporate the impact of attrition on the estimated effects. In all, there are ten regression-based estimates of the Year 12 effect for each gender in each cohort. The boxes in the figures show the range in which the middle half of the estimates lie for each gender/cohort group and the middle line of the box shows the median estimate. The ‘whisker’ lines cover the effective range of estimates and the dots any outlier estimates. Implicitly, all of the estimators are treated as equally likely to provide plausible estimates of the Year 12 effects.

Figure 1 indicates graphically that the participation activities—the full-time employment, full-time activities and unemployment effects—tend to be larger for females than males and that there was some deterioration in the size of the effect between cohorts for both genders. For the job-related outcomes in figure 2, there is less evidence of such a difference between genders, except for weekly earnings, which partly reflects the full-time wage effect for females, and there is no real evidence of any decline in the size of the effects between cohorts.

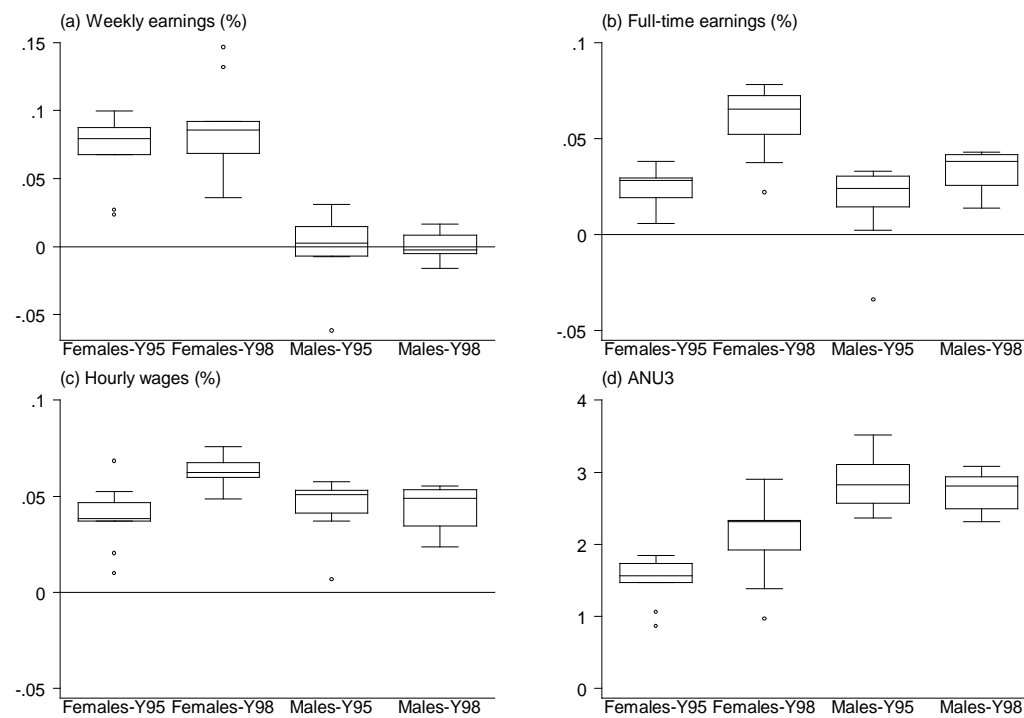
## Estimated effects of completing a vocational certificate

As stated, in this study individuals who proceeded from Year 12 to university within two years of completing Year 12 and those who proceeded to full-time study in VET within two years of completing Year 12 were excluded from the regression analysis. Hence, where the impact of completion of VET certificate-level qualifications is estimated, this involves analysis of the impact of completion of qualifications by individuals who either: left school without completing Year 12; completed Year 12 but undertook their certificates part-time; or commenced their study towards the certificates more than two years after completing Year 12. The vast majority of individuals who completed a VET qualification in the sample used here are in the first category—those who did not complete Year 12. While this seems the relevant comparison for the purposes of this paper, it means that, in interpreting the results, what needs to be borne in mind is that some groups of young people who complete VET certificate-level courses are excluded from the analysis.

**Figure 1 Summary of estimated Year 12 effects by gender and cohort across participation outcomes**



**Figure 2 Summary of estimated Year 12 effects by gender and cohort across job outcomes: wages and occupational status**



The effects of the certificate level II and III qualifications estimated by least squares are summarised in table 6, while those for apprenticeships and traineeships are summarised in table 7. The estimated effects on outcomes are for those who complete VET qualifications compared with early school leavers who do not. For presentational purposes the results are taken from data pooled for both cohorts, although discussion of some small differences in results by cohort is also provided below.

**Table 6 Estimated certificate level II and III effects: least squares estimates, data pooled across cohorts**

	Cert. II		Cert. III	
	Females	Males	Females	Males
Employed full-time (% points)	-0.016 (0.034)	-0.071** (0.032)	0.027 (0.021)	-0.084*** (0.025)
Full-time activity (% points)	-0.038 (0.032)	-0.070** (0.027)	0.011 (0.020)	-0.065*** (0.023)
Proportion unemployed (% points)	-0.001 (0.014)	0.059*** (0.021)	0.008 (0.009)	0.020* (0.011)
Weekly earnings (%)	-0.028 (0.035)	-0.016 (0.038)	0.017 (0.025)	-0.078*** (0.029)
Weekly earnings among full-time workers (%)	-0.056** (0.022)	-0.000 (0.035)	-0.003 (0.013)	-0.024 (0.022)
Hourly wages (%)	-0.038* (0.023)	-0.009 (0.024)	0.011 (0.014)	-0.001 (0.020)
Occupation (ANU3 scaled from 0 to 100)	-2.172*** (0.763)	-0.430 (1.283)	-0.278 (0.525)	1.027 (1.116)
Studying (% points)	-0.028* (0.017)	-0.007 (0.016)	-0.026** (0.012)	0.031** (0.015)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

Table 6 contains the estimates effects for females and males with qualifications at certificate II and III levels across the various outcomes. There do not appear to be widespread benefits from completion of either VET certificate level II or III qualifications. To the extent that any of the effects are significantly different from zero, they appear to be associated with negative effects on outcomes. This is not an outcome of the specific estimation approach used in table 6. If anything, the estimated effects using reweighting procedures for these certificates are slightly worse for males, although there may be some positive wage effects for females with certificate level III qualifications. This work is preliminary and is not precise about exactly what ‘equivalence’ to Year 12 might mean, but it does appear that the labour market outcomes achieved by those who undertake VET certificate level II or III qualifications are no better than those who do not undertake them and are not as good as those who complete Year 12.

**Table 7 Estimated apprenticeships and traineeships effects: least squares estimates, pooled data**

	Apprenticeships		Traineeships	
	Females	Males	Females	Males
Employed full-time (% points)	0.027 (0.027)	0.086*** (0.014)	0.141*** (0.021)	0.002 (0.017)
Full-time activity (% points)	0.016 (0.025)	0.055*** (0.013)	0.124*** (0.020)	0.005 (0.015)
Proportion unemployed (% points)	-0.002 (0.008)	-0.010* (0.006)	-0.022*** (0.007)	-0.011* (0.006)
Weekly earnings (%)	0.052* (0.027)	0.136*** (0.019)	0.065*** (0.022)	-0.016 (0.020)
Weekly earnings among full-time workers (%)	0.002 (0.018)	0.093*** (0.015)	-0.003 (0.013)	-0.013 (0.015)
Hourly wages (%)	0.015 (0.018)	0.083*** (0.015)	-0.009 (0.013)	-0.012 (0.015)
Occupation (ANU3 scaled from 0 to 100)	-1.223** (0.623)	-0.402 (0.552)	1.703*** (0.514)	0.201 (0.651)
Studying (% points)	-0.012 (0.014)	-0.043*** (0.007)	-0.012 (0.012)	0.003 (0.008)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

As noted in an earlier section, it is possible that completion of VET certificate qualifications is captured more accurately in the data for Y98 than Y95, since it has been sought each year in Y98, but only for later years in Y95 (although retrospective information was collected). This does not seem to be the main reason for there being few estimated positive effects. When the equation was estimated separately for each cohort, there are no positive significant effects for the qualification in Y98, and while the results are poorer in Y95, this is reflected more in the results for males than females, so it does not appear to be a general measurement issue.

From table 7, those males who complete an apprenticeship and females who complete a traineeship have substantially better outcomes than those who do not, outcomes that are typically better than those who complete Year 12. What comes through clearly from table 7 is that there are widespread benefits to completing an apprenticeship for males and for completing a traineeship for females, but not of completing the alternative qualification for either gender. The benefits include being more likely to be working full-time, being less likely to be unemployed and to be earning either higher real earnings (through increased full-time work for females) or, for males via apprenticeships, higher hourly wages. In general, the estimated benefits of completing an apprenticeship for males or a traineeship for females on the labour market outcomes are at least as great as those of completing Year 12. Like other studies, there is little evidence of any positive impact from completing an apprenticeship for females in these data. The results pointing to positive effects from traineeships for females, but not males, are new. It should be noted that most individuals who complete apprenticeships are male and most of those who complete a traineeship are female.

Equations were also estimated using a reweighting procedure similar to that used for the estimated Year 12 effects. An equation was estimated to identify the characteristics of those who completed a VET qualification (either a certificate or an apprenticeship). Unfortunately, it did not explain much of the variation in who actually obtained a VET qualification and few variables were significant. In these circumstances, the weights will not really distinguish between individuals, and the estimates using the reweighting procedure were little different from the least squares estimates and they are not discussed further.

## Robustness and interpretation

A number of features of the way the regression equations were estimated may have influenced the results presented. These features effectively amount to a set of restrictions on the equations. These include: that the Year 12 effects are the same for those with high and low or no ENTER scores; that the qualification effects are the same for those with differing levels of earlier Year 9 achievement; and that the outcomes of individuals with different qualifications follow the same post-school paths. Discussion of the results when these restrictions are relaxed follows and aids an understanding of key features of the results, such as why the estimated Year 12 effects for males in the Y98 cohort might be negative.

### High and low ENTER score effects for Year 12

It is possible that the Year 12 effects may be heterogeneous, in that they may vary for individuals who complete Year 12 certificates of differing quality. For example, they may differ between those who do well in their Year 12 marks, by comparison with those who do not. To test this, an indicator was included in the regression equation identifying whether individuals obtained an ENTER score above the median score obtained among the group studied here. When that variable was included, it was significant in only a few of the outcome equations. The main result that was consistent across genders and cohorts was that those who received high ENTER scores were most likely to be studying when surveyed, and possibly less likely to be working full-time. For males, they may also have received higher earnings if working full-time and worked in higher-status jobs.

While in general, the inclusion of the indicator for those who had a high ENTER score did not affect the estimated Year 12 effects very much, there was one important exception. The apparent decline in the full-time employment rates between cohorts seems to have been concentrated among those with high ENTER scores. The indicator was significant in the Y98 cohort equations for both males and females, but not in the Y95 equation. When the high ENTER indicator was included in the equation for Y98, the parameter of the Year 12 variable proper showed no significant decrease for either males or females, suggesting the decline in full-time employment rates took place among those with high ENTER scores and possibly reflects their greater participation in study activity. (The apparent negative Year 12 effect on participation in full-time activities from table 5 also falls.)

### Qualification by achievement interaction effects

In order to assess whether the estimated qualification effects were influenced in some way by the underlying ability of those who tended to complete them, interaction terms between the five qualifications (Year 12, certificate levels I and II, and apprenticeships and traineeships) and school achievement were also included in all of the outcome equations. In the participation equations, these interaction terms were not jointly significant. In the 'job quality' outcomes—wages and occupational status—the terms were sometimes jointly significant. Where the terms were jointly significant, the significant individual effects tended to be on the Year 12, apprenticeship or traineeship interaction variables and their sign was always negative. That is, those individuals whose school achievement levels were highest tended to derive the least benefit from completing these qualification levels. Hence, while achievement and completion of these qualifications tended to have a positive impact on most outcomes, their interaction was negative on the job-quality measures. Such results might come about if qualifications are associated with specific points in job hierarchies (especially entry points) which pay set earnings or wages. If the likelihood of completing the qualifications is positively associated with school achievement, higher-performing individuals would complete the qualifications but receive the same wages as (the smaller group of) individuals whose performance was not as good at school. Hence, the existence of such semi-rigid wage hierarchies, especially early in people's careers, could generate the types of effects found here.

The interactions between achievement and the certificate level II and III qualifications were never significant in any equation. Therefore, the results already presented for those qualifications—that they had non-positive effects on outcomes—are not explained by factors associated with the achievement levels of the types of people who complete them. The results mean that the estimated qualification effects were not ‘penalised’ because they did not work well for some particular group of individuals. Instead, they did not provide particular benefits across the entire ability distribution.

## Qualification by experience interaction effects

One feature of the estimated effects is that they assume that individuals who complete different types of qualifications follow comparable time paths, in terms of their outcomes after they complete those qualifications. Some qualifications may have an immediate one-off impact on outcomes (say, apprenticeships on earnings), with less pronounced later growth, while others may take longer for their full benefits to be realised. This can be tested through the inclusion of qualification and time since qualification completion interactions.

These qualifications by experience or time since school interactions do seem to be important in understanding some features of the results presented here, although the interaction terms were jointly significant in only some of the outcome equations (about a quarter of them). This is most obvious in relation to the Year 12 effect on further study. In the results presented in table 5 this effect appears to be negative or zero. This negative or zero effect appears to be the result of an immediate negative effect which then gets weaker as the time since school completion increases. The relationship for Year 12 completers and the probability of engaging in post-school study, relative to early leavers, is shown for males and females for both cohorts in the first panel of figure 3. After about four years, the combined Year 12 effect on the likelihood individuals study is positive.

Some other qualification effects seem to work in a similar way. As noted earlier, certificate level II and III qualifications appear to have non-positive effects on the outcomes measured here within the timeframe analysed. Once more, it appears that some of these results, although by no means all of them across all outcomes, may reflect a combination of initial negative effects and positive effects associated with the passage of time. The second panel of figure 3 shows results for certificate level II qualifications in the Y95 cohort and certificate level III qualifications in the Y98 cohort on full-time employment separately for males and females. The effects of the two certificates for females are initially negative, but eventually become positive with time since completing their schooling. One of the male effects also improves over time, but only marginally. The certificate level II qualification effect in the Y95 cohort remains negative throughout for males. A number of the time since school and traineeship interactions were negative for females (and the point estimates of the impact of traineeships larger) for the ‘participation’ outcomes in the Y98 cohort results. This suggests that the large initial benefits from completing a traineeship fell over time. The only other consistent effect was that the occupational status effect associated with Year 12 appeared to increase over time.

## Other factors affecting outcomes

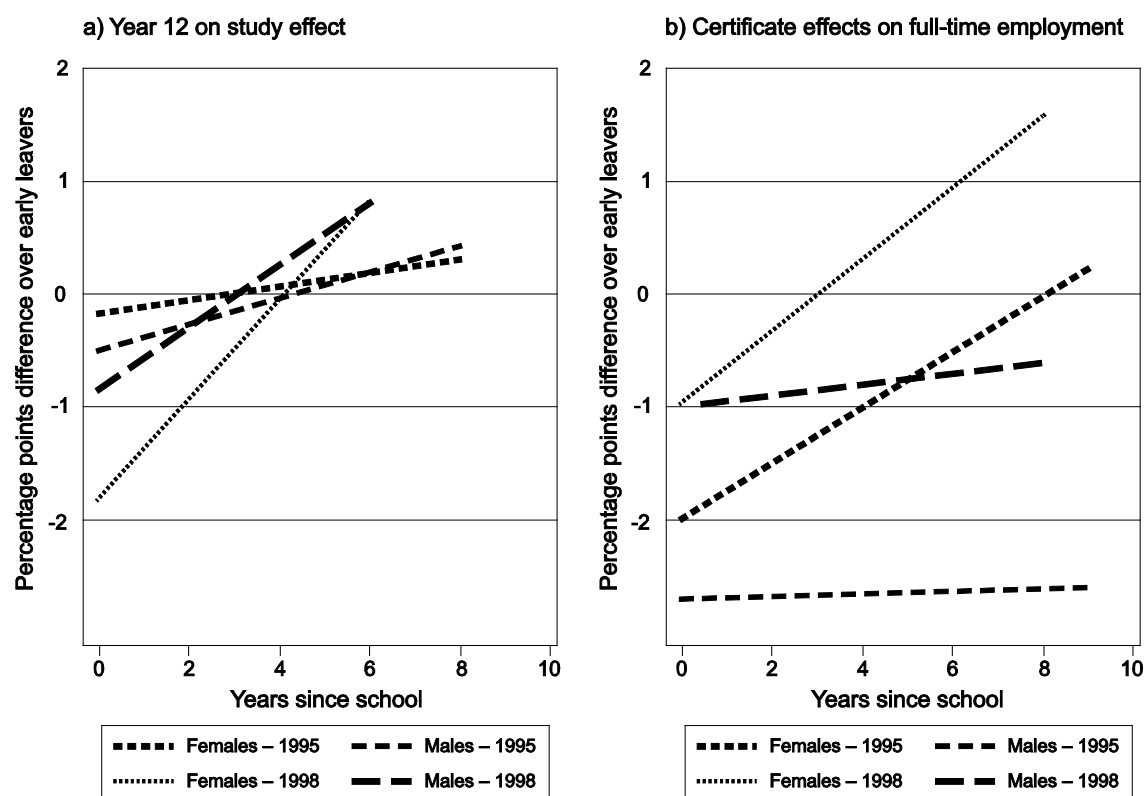
Other aspects of the regression results are summarised in a representative way in appendix table A.5. This table contains the full regression specifications for the male and female equations explaining who has a full-time job and hourly wages. These equations are estimated over the group of young people not proceeding to university or full-time VET study immediately after school. This makes the interpretation of many of the variables, particularly the demographic and school-related variables, difficult, since students from high socioeconomic status backgrounds (based on their parental education, occupation, the type of school they went to, the area they live in and with high achievement levels) are those most likely to have continued their study and not been among the



group used to estimate this equation. These variables should be viewed as controls so that the parameters on the qualification variables can be measured properly.

A number of the other effects are more readily interpreted. For example, years since school or experience has a positive impact on the proportion employed and on real wages. The effects on wages are quite large, with early years of experience adding around 9–10% to hourly wages, with this falling to around 5% after five years. Early years of experience add around 7% to the probability of being employed full-time. However, after six years, additional years of experience add little to this probability. These early career magnitudes are consistent with those estimated from wage equations over the entire workforce. There are differences by state and by cohort, along with a positive female Indigenous effect, one also found in these data by Dockery (2005).

**Figure 3 Examples of time since school varying qualification effects**



## Impact of attrition on estimated effects

As noted in an earlier section, attrition from these data takes two forms. The first is that some individuals leave the sample before their Year 12 completion or not is observed. The second is that individuals whose Year 12 completion is observed may leave the sample, which means that their outcomes are not observed. In this section, analysis of how the regression estimates of the impact of Year 12 completion change when account is taken of attrition is reported.

Attrition from longitudinal surveys displays a number of well-known features. It tends to be concentrated among low socioeconomic status individuals, is more prevalent among males, and, in studies like LSAY, it is also concentrated among groups of low school achievers (see, for example, Burkam & Lee 1998; Falaris & Peters 1998). The problem for this analysis is not that attrition is non-random; it is that those who drop out may have poorer outcomes than those who remain in the survey, so that attrition biases the estimates of the outcomes achieved by individuals. Nevertheless, the literature suggests that, in many instances, the biases for regression estimates of

the relationships between variables are not large (see, for example, Fitzgerald, Gottschalk & Moffit 1998; Lillard & Panis 1998; MacCurdy, Mroz & Gritz 1998; van den Berg 1998).<sup>8</sup>

## Attrition prior to Year 12

There are no certainties in the success of attempts to deal with attrition, since there are no data on the outcomes of those who drop out of the survey for the years after they leave it. The best that can be done is to assess how likely it is that attrition may have affected the results presented. The assessment of the potential impact of the first category of attrition is undertaken here by:

- ✧ estimating whether those who dropped out of the survey before Year 12 had the same intention to complete Year 12, given their characteristics, as those who did complete Year 12
- ✧ reweighting the data for those who remained in the survey, so that greatest weight is given to those individuals who most resembled those who dropped out of the survey before it was observed, whether or not they completed Year 12.

The first analysis involves the comparison of regression equations estimated separately over two groups. One group consists of those observed in the fifth wave survey of the two cohorts, the wave in which most individuals reported whether they obtained a Year 12 certificate. The other group are those who are non-respondents in the fifth wave. The dependent variable in both regression equations is whether the individual reported in the first wave of the survey intended to remain at school until Year 12, regressed on the observed first wave characteristics of individuals. These intentions will differ, since the average characteristics of the two groups differ. The test involves assessing how much of the difference in the two sets of intentions is explained by the characteristics of individuals and how much by differences in the way these are associated with the intentions in the two groups.

The results are reported in table 8, which contains the actual average Year 12 intentions of the two groups, the predicted average intentions for each group, given their own characteristics and parameters, and the predicted average intentions with their own characteristics and the parameters of the alternative group. There is a very small difference between the two sets of average predictions, suggesting that the way the characteristics of individuals were translated into intentions to complete Year 12 did not differ between the two groups. Formal tests suggest that, while the characteristics of the two groups do differ, the parameters of the two equations do not contribute to the small difference in average intentions between the group who remained in the survey and those who left.<sup>9</sup> Somewhat surprisingly, the intentions to complete Year 12 were marginally higher among the group who left the survey than those who remained. What should be clear is that the members of the group who remained in the survey were not fundamentally different in their attitudes towards completion of Year 12 compared with those in the group who remained in the survey.

The second analysis involves a probit regression equation of whether the young people were respondents in the fifth wave in each cohort or not. The predicted parameters are then used to estimate the propensity score of individuals to leave the survey. It is then possible to calculate an 'attrition' weight (as  $[1 - P_{ai}] / P_{ai}$ ), where  $P_{ai}$  is the estimated propensity score or probability of attrition by the fifth wave for each individual, given their characteristics, which is used in subsequent regressions on the outcomes for each individual who remains in the sample beyond the fifth wave.

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<sup>8</sup> Studies included in the 1998 symposium on attrition from panel data in the *Journal of Human Resources* generally found that attrition was non-random, being particularly concentrated among those from low socioeconomic status backgrounds (these are listed in the references). Without exception, however, the studies found that attrition had little impact on the relationships estimated over those who remained in the panel, whether fixed effects or other models were estimated. That is, attrition did not result in substantially biased parameter estimates, although it did sometimes affect the estimated intercepts.

<sup>9</sup> The test was conducted using the *oaxaca* program in *stata*, written by Jann (2008).

The results of this exercise are presented in the top panel of table 9. The table contains estimated Year 12 effects for the full set of outcomes for individuals, males and females for the Y95 and Y98 cohorts. The estimated effects tend to be slightly smaller than those reported earlier, being closer in magnitude to the estimated least squares effects from table 5 and the treatment of the non-treated effects from appendix table A.4. While there are a few instances of estimated negative Year 12 effects (on the proportion studying and a few male parameters), overwhelmingly, the effects of completion of Year 12 remain positive.

**Table 8 Intentions to complete Year 12**

	Respondents	Attrition group
Intending to complete Year 12 (%)	66.2	67.1
Predicted intentions (%)	66.2	67.1
Predicted intentions using other group's parameters (%)	65.8	67.2
Gap associated with differences in characteristics	1.1	
p-value	0.00	
Gap associated with differences in parameters	-0.4	
p-value	0.55	

## Attrition after Year 12

The potential impact of the second kind of attrition described earlier is assessed by:

- ✧ reweighting the data for those who remained in the survey after they were observed to either have completed Year 12 or not, so that greatest weight is given to those observations that most resemble the individuals who dropped out of the survey after they completed Year 12
- ✧ reweighting data on those individuals who remained in the survey but who were late responders (in the last 30% of responders each year), so that observations most like the late responders who actually dropped out of the survey were given the most weight
- ✧ considering individuals in this late responders group who dropped out of the survey and using the outcomes realised in their last year prior to dropping out and comparing these with the outcomes of those most like them among the late responders group who did not drop out in that same year.

The first analysis involves a probit regression equation of whether or not, for each cohort, individuals were respondents in subsequent waves beyond the fifth wave. Once more, the predicted parameters are used to estimate the propensity score of individuals to leave the survey. Once more, 'attrition' weights are calculated (as  $[1 - P_{bi}] / P_{bi}$ ), where  $P_{bi}$  is the estimated propensity score or probability of attrition after wave five for each individual and are used in subsequent regressions on the outcomes for each individual who remains in the sample in later waves. The approach is similar to that in Altonji, Bharadwaj and Lange (2008) to address the potential impact of attrition.

The results of this approach are reported in the bottom panel of table 9. The results are very similar to those estimated as the least squares estimates in table 5 and the treatment on the non-treated effects that appear in appendix table A.4. Once more, the estimates point to positive Year 12 effects across most outcomes.

The second analysis also involves use of a probit regression equation to generate weights to reweight respondents who remain in the survey. This time the comparison focuses on individuals who were late respondents in the previous wave, since this is associated with attrition. 'Late respondents' are those interviewed in the last 30% of respondents in the relevant wave. Given the way that the telephone interviews for the survey are scheduled, these people are typically either the hard-to-locate-or-catch or relatively reluctant participants. About 17% of individuals in the last 30% of respondents drop out of the survey in the following year, compared with just 9% of the group of

earlier respondents. The relationship between late response in one survey and attrition in the next is summarised in figure 4. This figure shows the estimated probability of exiting from the survey in each cohort by how close to the end of the survey period individuals responded in the previous wave. Those closest to the end of the survey period have low values for this variable, and attrition rates are highest among those closest to the end of the survey period.

The third analysis involves a comparison between the outcomes of individuals who left the survey and those most like them who are in the survey in the last year those leaving were observed. Once again this analysis is conducted among the group of late respondents. The comparison here involves the simple regression of the outcomes for the group of late respondents in the wave prior to the individuals' attrition.

The results of the second and third exercises are reported in appendix table A.6. Both sets of estimates are again very similar to the estimated treatment on the least squares effects from table 5 and the non-treated Year 12 effects that appear in appendix table A.4. In general, it seems that attempting to deal with attrition tends to push the estimated Year 12 effects down a little, but not outside the range of estimates provided by other estimation methods. Attrition-adjusted estimates still point to positive Year 12 effects across most outcomes considered here. Also of note here is that the weighted regression using the weights constructed to deal with both the survey design and sample attrition also provide very similar estimated Year 12 effects across the range of outcome variables.

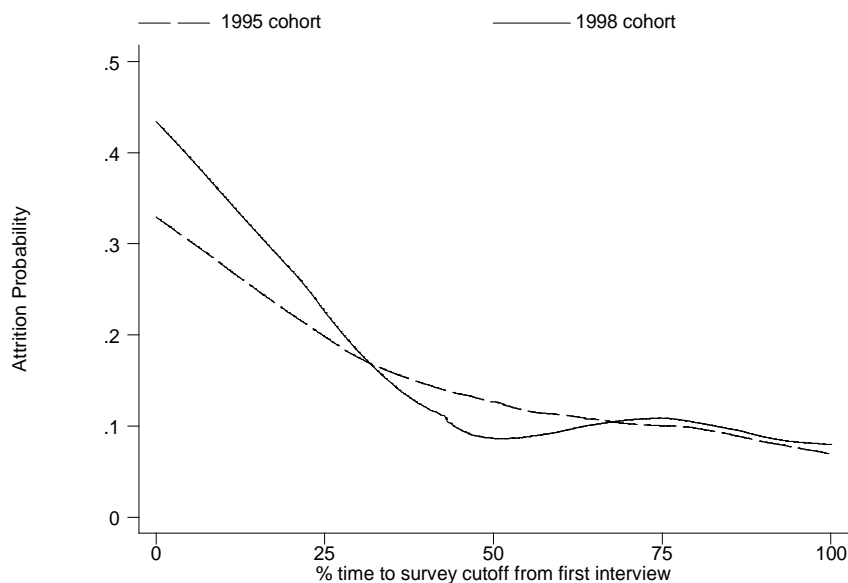
**Table 9 Estimated Year 12 completion effects: reweighted estimates adjusting for attrition**

	1995 cohort		1998 cohort	
	Females	Males	Females	Males
Attrition prior to Year 12				
Employed full-time (% points)	0.117*** (0.013)	0.001 (0.011)	0.070*** (0.012)	-0.030*** (0.010)
Full-time activity (% points)	0.106*** (0.013)	-0.007 (0.010)	0.011 (0.012)	-0.043*** (0.010)
Proportion unemployed (% points)	-0.032*** (0.006)	-0.035*** (0.006)	-0.038*** (0.006)	0.000 (0.005)
Weekly earnings (%)	0.099*** (0.018)	0.003 (0.015)	0.088*** (0.018)	-0.005 (0.013)
Weekly earnings among full-time workers (%)	0.038*** (0.011)	0.030*** (0.011)	0.066*** (0.011)	0.038*** (0.010)
Hourly wages (%)	0.047*** (0.011)	0.052*** (0.011)	0.062*** (0.011)	0.050*** (0.010)
Occupation (ANU3 scaled from 0 to 100)	1.762*** (0.373)	3.104*** (0.377)	2.321*** (0.362)	2.945*** (0.347)
Studying (% points)	0.005 (0.008)	0.003 (0.006)	-0.051*** (0.008)	-0.003 (0.006)
Attrition after Year 12				
Employed full-time (% points)	0.121*** (0.011)	0.011 (0.009)	0.077*** (0.014)	-0.043*** (0.011)
Full-time activity (% points)	0.110*** (0.011)	0.004 (0.009)	0.029** (0.014)	-0.050*** (0.011)
Proportion unemployed (%points)	-0.036*** (0.006)	-0.036*** (0.005)	-0.048*** (0.007)	-0.002 (0.006)
Weekly earnings (%)	0.097*** (0.015)	0.006 (0.012)	0.089*** (0.020)	-0.002 (0.015)
Weekly earnings among full-time workers (%)	0.033*** (0.010)	0.024*** (0.009)	0.075*** (0.013)	0.043*** (0.011)
Hourly wages (%)	0.037*** (0.010)	0.048*** (0.009)	0.062*** (0.013)	0.055*** (0.011)
Occupation (ANU3 scaled from 0 to 100)	1.470*** (0.303)	2.656*** (0.311)	2.329*** (0.402)	2.490*** (0.382)
Studying (% points)	0.003 (0.007)	0.004 (0.005)	-0.043*** (0.009)	0.002 (0.006)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

**Figure 4 Attrition rates by cohort and timing of previous wave interview**



## Summary

Estimates provided here of the impact of completion of Year 12 on a number of labour market outcomes can be given a causal interpretation. The estimates point to widespread, but modest, benefits from completion of Year 12 across full-time employment, unemployment and wages among the group who do not proceed from school to further education. The estimates withstand alternative methods of estimation and to attrition from the survey. A number of patterns are apparent in disaggregated data: the participation benefits are larger for females than males and are more evident in data from the Y95 cohort than the Y98 cohort. Across the wage and occupation outcomes, there is less difference between the genders and no real change in Year 12 effects between cohorts. The data also point to benefits from completing an apprenticeship or traineeship across most of the labour market outcomes, for females as well as males. The data do not show the same kind of benefits from completion of either VET certificate level II or III qualifications.

# Conclusions and implications

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The results of the analysis in this report point to widespread, but modest, effects from the completion of Year 12 among young Australians who do not proceed immediately from Year 12 to further studies. These effects include better full-time employment rates, lower incidence of unemployment, higher wages and higher-status jobs. The effects seem not to be related to the specific characteristics of individuals, except that they are more pronounced for females than for males and may have been lower for the most recent cohort than an earlier cohort, mostly related to the experience of those with higher ENTER scores.

The results also point to widespread and substantial benefits from completion of an apprenticeship for males and a traineeship for females. The effects for females of traineeships are comparable in magnitude with the apprenticeship effects for males. This result is something of a departure from earlier studies, which have tended to find that VET qualifications have provided greater benefits to males rather than females. These studies were largely conducted at a time when, in terms of numbers, traditional apprenticeships dominated traineeships. It seems that traineeships have become a more widely accepted and valued qualification for females in the occupations where they operate than was previously the case.

By contrast, those individuals who had completed VET certificate level II and III qualifications had poorer outcomes than Year 12 and male apprenticeship or female traineeship completers. Their outcomes were no better, and in some cases worse, than early school leavers who had not undertaken any post-school qualifications. Some part of these differences may reflect differences in how long it takes for positive effects to be realised, but not all of them. While it may be the case that these certificates are vocational equivalents to Year 12 in some learning dimensions, in dimensions that clearly relate to the labour market—for example, full-time employment and wage outcomes—these certificates are not providing anything like equivalence in outcomes at present.

Work is needed to specify exactly what equivalence between vocational and academic qualifications means beyond equivalence in labour market outcomes. It is intended that this issue be explored further in future work with LSAY data. Future work might also aim to explore whether the poorer outcomes for these qualifications reflect the content and nature of the qualifications, aspects of the characteristics or behaviour of individuals who complete the qualifications, or of the acceptance of these qualifications in the community and by employers. It appears not to be the case that young people completing these qualifications have poorer current outcomes because they are engaged in still further study, so the source of these poorer outcomes for these qualifications must lie elsewhere.

Further, the analysis here takes account of student achievement and intentions towards further study, so it seems likely that these outcomes do not reflect differences in underlying ability. The characteristics of the courses undertaken by individuals, such as their fields of study and work experience components and so on, have not been analysed here and these may be important in future work in understanding the outcomes achieved by individuals. Also, future work should address whether changes since these data were collected in Australia, such as in VET provision and in the type of Year 12 courses offered students, including those with a greater vocational orientation, have led to better outcomes for students. Until more is known about what works in terms of the design of certificate level II and III courses, those qualifications should not be viewed as providing labour market outcomes for individuals early in their working lives that are equivalent to Year 12.

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# Appendix tables

**Table A.1 Estimated Year 12 completion effects: least squares estimates, Y95 and Y98 (separate regressions for each cohort)**

	Y95		Y98	
	Females	Males	Females	Males
Employed full-time (% points)	0.115*** (0.020)	0.008 (0.016)	0.088*** (0.021)	-0.030* (0.018)
Full-time activity (% points)	0.112*** (0.019)	-0.002 (0.014)	0.036* (0.021)	-0.039** (0.016)
Proportion unemployed (% points)	-0.037*** (0.007)	-0.034*** (0.008)	-0.042*** (0.010)	-0.005 (0.008)
Weekly earnings (%)	0.069*** (0.025)	0.015 (0.019)	0.094*** (0.027)	-0.000 (0.022)
Weekly earnings among full-time workers (%)	0.025 (0.015)	0.031** (0.015)	0.077*** (0.016)	0.046*** (0.015)
Hourly wages (%)	0.031** (0.014)	0.053*** (0.013)	0.065*** (0.014)	0.050*** (0.015)
Occupation (ANU3 scaled from 0 to 100)	1.081** (0.489)	2.410*** (0.551)	3.652*** (0.560)	4.083*** (0.569)
Studying (% points)	0.009 (0.010)	-0.003 (0.008)	-0.041*** (0.014)	0.008 (0.010)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

**Table A.2 Estimated Year 12 and VET qualification completion equation results**

Characteristic	OLS	Probit	Probit
	school	school	VET
	Completion	Completion	Completion
Male	-0.048*** (0.011)	-0.142*** (0.033)	-0.120*** (0.034)
State university continuation rate	-0.497 (0.393)	-1.341 (1.160)	1.260 (1.179)
Grade when turned 15	0.021** (0.010)	0.065** (0.030)	0.030 (0.031)
Proportion of state grade cohort aged 12 in Year 8	-0.010 (0.006)	-0.024 (0.019)	-0.016 (0.019)
Proportion at school planning to complete Year 12	0.334*** (0.069)	0.976*** (0.204)	-0.106 (0.209)
Average school ANU3 score	-0.001 (0.001)	-0.002 (0.003)	-0.003 (0.003)
Proportion at school planning to go to university	-0.090 (0.059)	-0.251 (0.179)	-0.190 (0.181)
Year 9 achievement	0.007*** (0.001)	0.020*** (0.002)	-0.001 (0.002)
Head of household ANU3 score in Year 11/100	0.000 (0.000)	0.001 (0.001)	0.001 (0.001)
Metropolitan	0.005 (0.012)	0.016 (0.036)	-0.110*** (0.036)
Indigenous Australian	-0.125*** (0.034)	-0.351*** (0.097)	0.065 (0.109)
Father working in Year 11	0.023* (0.014)	0.067* (0.040)	0.008 (0.042)
Father with degree	0.005 (0.018)	0.023 (0.057)	-0.140** (0.057)
Mother with degree	-0.022 (0.018)	-0.072 (0.056)	0.004 (0.056)
Number of siblings	-0.009** (0.004)	-0.028** (0.012)	-0.016 (0.012)
Respondent born overseas in English-speaking country	0.036 (0.032)	0.099 (0.098)	-0.197* (0.110)
Respondent born overseas in non-English-speaking country	0.012 (0.032)	0.035 (0.099)	-0.372*** (0.104)
Catholic school	0.084*** (0.015)	0.259*** (0.049)	-0.025 (0.048)
Independent school	0.037* (0.021)	0.097 (0.066)	0.052 (0.067)
Postcode ranking of average taxable non-labour income	0.113*** (0.023)	0.344*** (0.069)	-0.049 (0.068)
Self-confidence scale	0.004*** (0.001)	0.013*** (0.002)	0.002 (0.002)
Victoria	0.023 (0.037)	0.060 (0.110)	-0.200* (0.108)
Queensland	0.359* (0.205)	0.949 (0.599)	0.485 (0.608)
South Australia	-0.067 (0.058)	-0.222 (0.166)	0.027 (0.165)

Characteristic	OLS school	Probit school	Probit VET
	Completion	Completion	Completion
Western Australia	0.272 (0.267)	0.640 (0.782)	0.386 (0.791)
Tasmania	-0.119*** (0.029)	-0.330*** (0.083)	0.182** (0.082)
Northern Territory	-0.212* (0.121)	-0.602* (0.361)	0.109 (0.365)
Australian Capital Territory	0.094 (0.058)	0.252 (0.173)	-0.374** (0.171)
Y98 cohort	-0.006 (0.005)	-0.017 (0.016)	0.070*** (0.016)
Planned in Year 9 to leave school after Year 12	0.171*** (0.014)	0.466*** (0.038)	-0.005 (0.039)
Planned in Year 9 to study at uni in future	0.047*** (0.013)	0.143*** (0.039)	-0.077* (0.041)
Received Year 12 certificate			-0.190*** (0.036)
Constant	0.369 (0.661)	-0.692 (1.955)	-7.722*** (1.958)
Number of observations	6 899	6 899	31 636
R2	0.150		

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

**Table A.3 Estimated Year 12 completion effects: reweighted estimates**

	1995 cohort		1998 cohort	
	Females	Males	Females	Males
<b>Treatment on the treated</b>				
Employed full-time (% points)	0.132*** (0.011)	0.002 (0.009)	0.088*** (0.013)	-0.002 (0.011)
Full-time activity (% points)	0.138*** (0.011)	-0.012 (0.009)	-0.018 (0.012)	-0.023** (0.010)
Proportion unemployed (% points)	-0.034*** (0.005)	-0.030*** (0.005)	-0.032*** (0.006)	-0.003 (0.006)
Weekly earnings (%)	0.079*** (0.016)	-0.002 (0.013)	0.147*** (0.018)	-0.003 (0.014)
Weekly earnings among full-time workers (%)	0.006 (0.010)	0.017* (0.009)	0.052*** (0.012)	0.014 (0.010)
Hourly wages (%)	0.010 (0.010)	0.050*** (0.009)	0.063*** (0.011)	0.024** (0.010)
Occupation (ANU3 scaled from 0 to 100)	1.668*** (0.332)	2.572*** (0.335)	0.966*** (0.372)	2.667*** (0.375)
Studying (% points)	0.021*** (0.007)	-0.008 (0.005)	-0.101*** (0.008)	-0.008 (0.006)
<b>Treatment on the untreated</b>				
Employed full-time (% points)	0.122*** (0.011)	0.009 (0.009)	0.079*** (0.013)	-0.032*** (0.011)
Full-time activity (% points)	0.125*** (0.011)	-0.004 (0.009)	0.041*** (0.013)	-0.041*** (0.010)
Proportion unemployed (% points)	-0.034*** (0.005)	-0.032*** (0.005)	-0.047*** (0.007)	-0.002 (0.006)
Weekly earnings (%)	0.079*** (0.016)	0.015 (0.012)	0.092*** (0.019)	0.016 (0.014)
Weekly earnings among full-time workers (%)	0.015 (0.010)	0.024*** (0.009)	0.072*** (0.013)	0.042*** (0.011)
Hourly wages (%)	0.021** (0.010)	0.053*** (0.009)	0.071*** (0.012)	0.055*** (0.011)
Occupation (ANU3 scaled from 0 to 100)	1.736*** (0.319)	2.454*** (0.319)	2.298*** (0.377)	2.313*** (0.363)
Studying (% points)	0.016** (0.007)	-0.007 (0.005)	-0.032*** (0.008)	0.001 (0.006)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

**Table A.4 Estimated Year 12 completion effects: propensity-score-matching estimates**

	1995 cohort		1998 cohort	
	Females	Males	Females	Males
<b>Treatment on the treated</b>				
Employed full-time (% points)	0.110*** (0.025)	0.032 (0.024)	0.109*** (0.029)	0.017 (0.027)
Full-time activity (% points)	0.103*** (0.030)	0.026 (0.027)	-0.042 (0.028)	-0.029 (0.024)
Proportion unemployed (% points)	-0.022** (0.008)	-0.036*** (0.010)	-0.024*** (0.008)	0.006 (0.005)
Weekly earnings (%)	0.050 (0.028)	-0.050** (0.021)	0.099*** (0.029)	-0.043 (0.033)
Weekly earnings among full-time workers (%)	-0.058** (0.021)	-0.059*** (0.017)	-0.030 (0.030)	-0.058** (0.019)
Hourly wages (%)	-0.021 (0.023)	-0.001 (0.019)	-0.004 (0.019)	-0.010 (0.016)
Occupation (ANU3 scaled from 0 to 100)	0.279 (0.367)	0.614 (0.511)	-0.611 (0.722)	0.637 (1.154)
Studying (% points)	0.005 (0.013)	0.001 (0.012)	-0.162*** (0.029)	-0.037** (0.015)
<b>Treatment on the untreated</b>				
Employed full-time (% points)	0.106*** (0.027)	-0.026 (0.016)	0.044 (0.033)	-0.097** (0.033)
Full-time activity (% points)	0.101** (0.034)	-0.043** (0.016)	0.002 (0.038)	-0.110** (0.037)
Proportion unemployed (% points)	-0.033** (0.012)	-0.016 (0.011)	-0.033*** (0.011)	0.016 (0.011)
Weekly earnings (%)	0.007 (0.028)	-0.052* (0.026)	0.008 (0.027)	-0.123** (0.045)
Weekly earnings among full-time workers (%)	-0.069** (0.026)	-0.037* (0.018)	0.002 (0.019)	-0.053* (0.025)
Hourly wages (%)	-0.041 (0.015)	0.016 (0.019)	0.023 (0.019)	-0.031 (0.024)
Occupation (ANU3 scaled from 0 to 100)	0.268 (0.442)	1.010 (0.751)	-0.008 (0.740)	-0.537 (0.754)
Studying (% points)	0.003 (0.015)	-0.017*** (0.005)	-0.059* (0.020)	-0.008 (0.011)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.

**Table A.5 Full regression estimates: full-time employment and hourly wages**

	Full-time employment		Log of hourly wages	
	Females	Males	Females	Males
Year 9 achievement	0.003*** (0.001)	-0.002** (0.001)	0.003*** (0.001)	0.002*** (0.001)
Head of household ANU3 score in Year 11/100	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Metropolitan	0.011 (0.014)	-0.043*** (0.011)	0.023*** (0.009)	0.026*** (0.009)
Indigenous Australian	-0.003 (0.036)	-0.064 (0.040)	0.089*** (0.028)	-0.007 (0.034)
Father working in Year 11	0.087*** (0.016)	0.076*** (0.014)	-0.005 (0.011)	-0.015 (0.011)
Father with degree	-0.030 (0.023)	-0.026 (0.017)	0.042*** (0.013)	0.025* (0.015)
Mother with degree	-0.089*** (0.022)	-0.051*** (0.017)	-0.011 (0.014)	0.028* (0.016)
Number of siblings	-0.006 (0.005)	-0.005 (0.004)	0.003 (0.003)	0.008** (0.004)
Respondent born overseas in English-speaking country	-0.017 (0.037)	-0.041 (0.036)	0.032 (0.024)	0.078*** (0.029)
Respondent born overseas in non-English-speaking country	-0.105*** (0.034)	-0.119*** (0.032)	0.018 (0.025)	0.035 (0.030)
Catholic school	0.021 (0.017)	0.002 (0.014)	0.011 (0.010)	0.027** (0.012)
Independent school	-0.011 (0.022)	-0.040** (0.018)	0.001 (0.014)	0.024* (0.015)
Postcode ranking of average taxable non-labour income	-0.091*** (0.026)	-0.057*** (0.020)	-0.030* (0.016)	0.019 (0.016)
Victoria	-0.026 (0.021)	-0.035** (0.017)	-0.003 (0.014)	-0.018 (0.015)
Queensland	-0.080*** (0.020)	-0.008 (0.016)	-0.048*** (0.013)	-0.053*** (0.013)
South Australia	-0.032 (0.025)	-0.027 (0.018)	-0.002 (0.014)	-0.029 (0.017)
Western Australia	-0.010 (0.024)	-0.057*** (0.019)	-0.039** (0.015)	-0.034** (0.016)
Tasmania	-0.024 (0.030)	-0.060** (0.027)	-0.046** (0.018)	-0.077*** (0.020)
Northern Territory	-0.068* (0.037)	-0.050 (0.036)	0.058* (0.030)	-0.006 (0.025)
Australian Capital Territory	-0.025 (0.036)	-0.038 (0.032)	0.032 (0.021)	0.003 (0.025)
Y98 cohort	-0.037 (0.023)	0.018 (0.017)	-0.005 (0.016)	0.018 (0.015)
Y95 Year 12 certificate	0.115*** (0.019)	0.013 (0.015)	0.037*** (0.014)	0.054*** (0.012)
Y98 Year 12 certificate	0.080*** (0.021)	-0.037** (0.017)	0.058*** (0.014)	0.048*** (0.015)

	Full-time employment		Log of hourly wages	
	Females	Males	Females	Males
VET certificate level II	-0.016 (0.034)	-0.071** (0.032)	-0.038* (0.023)	-0.009 (0.024)
VET certificate level III	0.027 (0.021)	-0.084*** (0.025)	0.011 (0.014)	-0.001 (0.020)
Completed apprenticeship/ traineeship	0.148*** (0.017)	0.070*** (0.012)	0.011 (0.011)	0.067*** (0.011)
Constant	0.184*** (0.065)	0.576*** (0.053)	2.086*** (0.045)	2.070*** (0.047)
Number of observations	15 167	17 919	10 760	13 517
R2	0.054	0.070	0.108	0.141

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.



**Table A.6 Estimated Year 12 completion effects: reweighted estimates adjusting for attrition, late respondents**

	1995 cohort		1998 cohort	
	Females	Males	Females	Males
<b>Rewighted estimates</b>				
Employed full-time (% points)	0.112*** (0.012)	0.010 (0.010)	0.082*** (0.013)	-0.033*** (0.010)
Full-time activity (% points)	0.099*** (0.011)	0.002 (0.009)	0.035*** (0.013)	-0.042*** (0.010)
Proportion unemployed (%points)	-0.031*** (0.006)	-0.037*** (0.005)	-0.042*** (0.006)	0.000 (0.006)
Weekly earnings (%)	0.082*** (0.016)	-0.007 (0.013)	0.083*** (0.018)	0.008 (0.013)
Weekly earnings among full-time workers (%)	0.029*** (0.010)	0.014 (0.010)	0.068*** (0.012)	0.042*** (0.010)
Hourly wages (%)	0.040*** (0.010)	0.041*** (0.010)	0.065*** (0.011)	0.053*** (0.010)
Occupation (ANU3 scaled from 0 to 100)	1.486*** (0.330)	2.809*** (0.337)	2.264*** (0.368)	2.711*** (0.354)
Studying (% points)	-0.003 (0.007)	0.002 (0.005)	-0.040*** (0.008)	0.003 (0.005)
<b>Previous wave estimates</b>				
Employed full-time (% points)	0.098*** (0.030)	0.021 (0.022)	0.078*** (0.027)	-0.045** (0.021)
Full-time activity (% points)	0.099*** (0.030)	0.031 (0.021)	0.027 (0.026)	-0.053*** (0.020)
Proportion unemployed (%points)	-0.040*** (0.013)	-0.047*** (0.011)	-0.040*** (0.012)	0.006 (0.010)
Weekly earnings (%)	0.024 (0.041)	-0.007 (0.028)	0.036 (0.029)	-0.016 (0.024)
Weekly earnings among full-time workers (%)	0.020 (0.027)	0.002 (0.024)	0.022 (0.019)	0.028 (0.020)
Hourly wages (%)	0.068*** (0.024)	0.037* (0.022)	0.048*** (0.018)	0.030 (0.020)
Occupation (ANU3 scaled from 0 to 100)	0.859 (0.840)	3.519*** (0.795)	1.921*** (0.660)	2.914*** (0.701)
Studying (% points)	0.017 (0.015)	0.014 (0.010)	-0.045*** (0.017)	0.005 (0.010)

Note: Standard errors in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Source: Estimated from LSAY Y95 and Y98 cohort.



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