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# Analysis of private returns to vocational education and training

MELBOURNE INSTITUTE  
OF APPLIED ECONOMIC  
AND SOCIAL RESEARCH

*Wang-Sheng Lee*

*Michael Coelli*

A NATIONAL VOCATIONAL  
EDUCATION AND TRAINING  
RESEARCH AND EVALUATION  
PROGRAM REPORT



Australian Government  
Department of Education, Employment  
and Workplace Relations





NCVER

# Analysis of private returns to vocational education and training

*Wang-Sheng Lee*

*Michael Coelli*

*Melbourne Institute of Applied Economic and Social Research*

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

ph +61 8 8230 8400 fax +61 8 8212 3436  
email [ncver@ncver.edu.au](mailto:ncver@ncver.edu.au)  
<<http://www.ncver.edu.au>>  
<<http://www.ncver.edu.au/publications/2221.html>>

## *Analysis of private returns to vocational education and training*

Wang-Sheng Lee and Michael Coelli, Melbourne Institute of Applied Economic and Social Research

In 2008 as part of a national push to increase Australia's skill levels, the Council of Australian Governments agreed on targets that would see, by 2020, a doubling of diploma and advanced diploma completions and a halving of the proportion of 20 to 64-year-old Australians without at least a certificate III. Such targets assume there is a financial return as a result of undertaking vocational education and training (VET). Using data from the Australian Bureau of Statistics' (ABS) Surveys of Education and Training (1993–2005), this study investigated this assumption by looking at the employment and earnings for individuals who had completed a VET course and how these may have changed over time.

This work examines the effect of field of education on the returns from VET for individuals, as well as the returns from VET for mature-age students (defined here as persons between 30 and 64 years). It also compares these with higher educational qualifications. This study differs from previous research on returns from VET in that it does not determine the individual rate of return from investing in a VET course. Rather, the authors determine the effects of educational qualification on employment and earnings outcomes, and how these have changed over time.

## Key messages

- ✧ Compared with those who have completed Year 12, employment and earnings benefits are only gained by completing a VET course at the diploma level. This result differs from some previous studies (for example, Long & Shah 2008). However, by comparison with individuals who do not complete Year 12, both employment and earnings benefits can be gained from completion of a VET qualification at any level, an outcome which accords with previous research.
- ✧ Undertaking courses in the area of business, engineering, architecture, building and automotive provides the greatest benefits relative to those who did not complete Year 12.
- ✧ For mature-age students, those who have not completed Year 12 and undertake a VET course at the certificate III level or higher gain the greatest employment and earnings benefits. However, there is a lag of several years before these benefits materialise.
- ✧ The study covers the period 1993 to 2005 to assess whether VET qualifications have continued to attract similar returns relative to Year 12 and non-school completers. The earning benefits from completing a diploma were shown to be relatively stable during this period. At the sub-diploma level there were more fluctuations but, relative to non-school completers, returns from these qualifications were positive. This was not the case when comparisons were made to Year 12 completers.

The difference in findings between this and previous studies highlights the complexity of measuring private returns from education. Decisions made about the comparison groups, the degree of disaggregation of educational levels, data sets and the statistical techniques used all impact on the results. So too does the influence of variables such as prior educational achievement, ability, opportunity or motivation—variables which are not present in the Survey of Education and Training. Nevertheless, this study makes it clear that we cannot assume VET has a financial return to the individual; it all depends on educational background and the level and field of the qualification being undertaken.

Tom Karmel  
Managing Director, NCVER



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# Executive summary

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This report provides estimates of the effects of completing a vocational education and training (VET) qualification on employment and earnings outcomes. Having explicit estimates of the returns from VET is important because such information allows individuals to weigh the potential benefits of acquiring these qualifications. The methodology we use is one based on matched comparisons of persons at each level of VET qualification with Year 12 completers and those who did not complete Year 12.

The data we use for the analysis come from four waves of the Survey of Education and Training (SET)—1993, 1997, 2001 and 2005—conducted by the Australian Bureau of Statistics (ABS). These are national household surveys which collect detailed information on socio-demographic characteristics, employment characteristics and educational qualifications obtained.

Part of the analysis of the effects of VET qualifications over the period 1993 to 2005 is complicated by the fact that in the late 1990s, the Australian Qualifications Framework (AQF) was introduced and this completely changed the types of educational qualifications that were awarded. With the introduction of AQF, basic vocational, skilled vocational, and associate diplomas were superseded by certificates I–IV, diplomas and advanced diplomas. In this report, we make our best attempt to provide concordance between the pre-AQF credentials and AQF credentials using the Survey of Education and Training data.

This report builds on the existing Australian literature by providing a comprehensive analysis of the effects of VET qualifications relative to Year 12 completers and those who did not complete Year 12. The analysis of returns from VET is of high policy relevance because it is precisely people who completed Year 12 or less who would be most interested in the potential benefits from obtaining VET qualifications. In addition, and an important extension to the previous research in this area, results by field of education are provided, as well as empirical estimates of the effects of VET qualifications for mature-age students. This study builds on the existing literature on returns from VET qualifications by expanding the scope of coverage to the period 1993–2005 (the period where Survey of Education and Training data from ABS are available), and by using a statistical procedure known as matching, where emphasis is placed on creating the most appropriate comparison groups for VET participants.

In this study, to take into consideration the returns from VET within a broad education framework, VET qualifications are split into a four-level qualification classification: bachelor degree and above; associate diploma (advanced diploma/diploma); skilled vocational qualifications (certificates III–IV); and basic vocational qualifications (certificates I–II), where the qualifications in parentheses are the post-AQF equivalents. In addition, three broad fields of education are considered: business (including management and commerce); engineering and related technologies; architecture, building and construction; and other.

The following are the main findings of our analysis:

- ✧ Relative to Year 12 completers, there are no benefits from obtaining basic/skilled vocational (pre-AQF) or certificate I–IV (post-AQF) qualifications. However, there are positive employment and earnings outcomes associated with advanced diploma/diploma qualifications.

For example, in 2005, males with advanced diplomas/diplomas were 4.7 percentage points more likely to be employed than males with a Year 12 qualification. They were also earning on average 6.9% more per week.

- ✧ Relative to persons who did not complete Year 12, there are benefits to be obtained from obtaining any kind of VET qualification, including the lower-level certificate I–II qualifications. In all the years examined, people with VET qualifications had relatively higher average weekly earnings and a higher likelihood of being in permanent employment.
- ✧ The finding that, relative to Year 12 completers, there are no employment or earnings benefits from completing a certificate III–IV qualification differs from the findings in some previous research but are consistent with the findings in several others. Perhaps an important issue to consider in assessing the value of certificate III–IV qualifications is whether school completers or non-completers are more appropriate as a comparison group.
- ✧ Estimation of the effects of VET mentioned so far are not conditional on school completion status. In other words, they do not account for the fact that there are individuals with VET qualifications who might or might not have completed Year 12. Alternatively, it would be possible to only compare Year 12 completers with VET completers who have also completed Year 12, and similarly to only compare persons with less than Year 12 with VET completers who have also less than Year 12. Estimates of the returns from VET using this alternative approach find that in general, for comparisons relative to Year 12 completers, removing non-completers from the VET group increases the estimated size of the returns; for comparisons relative to people with less than Year 12, removing Year 12 completers from the VET group reduces the estimated size of the impact.
- ✧ Relative to persons who did not complete Year 12, the fields of education that provide the largest effects on earnings and employment outcomes appear to be business, engineering, architecture, building, and automotive.
- ✧ For mature-age students contemplating whether or not to undertake education to obtain a VET qualification, it appears that it is only worthwhile to do so if individuals have fewer than 12 years of schooling, and are intending to enrol in VET courses at the certificate III level or higher. Furthermore, in such instances, it might take a year or two before any positive effects of the investment in education materialise.
- ✧ There have been no dramatic changes over time in the returns from VET qualifications. Between 1993 and 1997, the earnings premium of associate diploma holders relative to both Year 12 completers and non-school completers was positive and of a similar magnitude. Similarly, between 2001 and 2005, the earnings premium of advanced diploma/diploma holders relative to both Year 12 completers and non-school completers was somewhat constant. It is harder to compare changes that took place pre- and post-1997 because of the introduction of AQF and the subsequent re-labelling of credentials. There were more fluctuations over time in the earnings premium to the sub-diploma VET qualifications. But relative to non-school completers, it is clear that over the entire period, 1993 to 2005, there were statistically significant returns from having such VET qualifications.

# Introduction

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Ongoing feedback on the performance of participants in the vocational education and training system is important in justifying existing levels of public expenditure. If positive employment and earnings outcomes are found, this would serve to encourage future participation by others. Positive returns might also encourage former participants to return to VET to upgrade their skills and/or develop new ones. VET plays an important role according to the 1999 Adelaide Declaration on National Goals for Schooling in the Twenty-First Century. In particular, VET can be helpful in developing employment-related skills and an understanding of the work environment, providing foundation-building pathways for alternative career options, and providing opportunities for lifelong learning.

If we are to motivate individuals to participate in VET and convince them that it is worth their while investing their time and resources in acquiring a VET qualification, then reliable estimates of the returns from VET must be well known and explicit. This is similar to how many people with bachelor degrees in the workforce decide whether or not to invest in a Masters in Business Administration (MBA) degree. The returns from this degree are well known because of frequent salary surveys that publicise the average salaries of individuals with bachelor degrees and those with MBAs.<sup>1</sup> Likewise, if it is clear to individuals what the expected returns are to acquiring certain types of VET qualifications (by comparison with the counterfactual state of not acquiring a VET qualification), informed decisions can be made by young people and those who offer them career guidance on what courses to undertake. Such key decisions can be pivotal in helping them achieve success later in life.

This report aims to assess the effects of completing a VET qualification on employment and earnings outcomes. It focuses on estimating the effects of VET for those who have left secondary school. Specifically, this report will address the following questions:

- ✧ How do returns from VET qualifications in Australia vary by level of qualification and field of education?
- ✧ What are the returns from VET qualifications in Australia for more mature-age students who obtain their qualifications later in life? How do they compare with the returns to students who obtain their qualifications when they are younger?
- ✧ Have the returns from VET qualifications in Australia changed over time during the period 1993 to 2005, the period where the Survey of Education and Training data from the ABS were available?

The issue of estimating returns from VET by level of qualification is not new and has been addressed by many Australian researchers in the past. However, the methodology we adopt in this report is new. Given the data available, we attempt to estimate the returns from a VET qualification

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<sup>1</sup> For example, the *Financial Times*, a UK-based newspaper, conducts an annual international survey of MBA alumni and reports their average salary. Business schools often also survey their graduating class for information regarding the average starting salary package.

in the most rigorous fashion possible using program-evaluation techniques. In addition, estimating returns by field of education and for mature-age students are relatively unexplored areas. Estimates of such returns can be helpful in shedding more light on the nature of returns from VET for different sub-populations. Note that 'returns' in this report refers to employment and earnings outcomes. They are not true returns in the sense that costs of undertaking education are not taken into account.

The next section briefly places our current study in the context of the Australian literature. The methodology and data used in this report are described in the following section; this is followed by a description of how we set up the data to form 'treatment' and 'comparison' groups in order to estimate returns from VET. Such an approach attempts to mimic a randomised experiment, in which differences in outcomes between the two groups can be viewed as the impact of VET and not dependent on covariates of VET participation. The following chapter describes the employment and earnings outcomes we focus on in this report, while the next provides some descriptive statistics of the variables that are used in the multivariate analysis. Estimates of returns from VET by level of qualification and field of education are then given, followed by estimates of returns from VET for mature-age students. There is a final concluding chapter.

## Previous research on returns from VET

In general, two main approaches have been used to provide estimates of the returns from VET in Australia. The first approach is based on calculating an internal rate of return (IRR) from investing in education. This essentially involves obtaining estimates of the stream of costs and benefits of making an investment in education over an individual's lifetime. The internal rate of return is then constructed by determining the interest or discount rate that equates to the present discounted value of the costs and benefits. Australian research based on this approach of estimating the returns from VET include Ryan (2002a) and Long and Shah (2007). Borland (2002) constructed internal rate of return measures at university level for Australia. Overviews of Australian research on returns from VET qualifications conducted prior to these studies are provided in Ryan (2002a, 2002b) and Long and Shah (2007), and will not be repeated here.

The second main approach to estimating the returns from education is to estimate a Mincer equation for labour market earnings. This approach involves estimating some variation of a log earnings regression on years of schooling and years of post-school work experience, and interpreting the coefficient on schooling as the returns from schooling.<sup>2</sup> Over the years, many variations of the Mincer equation approach have been employed. These focus on identifying the average relationship between earnings and schooling and not on constructing an internal rate of return.<sup>3</sup> For example, in estimating the economic return from various levels of education in Australia, Leigh (2008) first identified appropriate comparison groups for individuals with certain educational qualifications and restricted his sample accordingly before proceeding with his analysis. In addition, as standard linear ordinary least squares (OLS) regression estimates of the coefficient on schooling are likely to be biased because of self-selection into schooling (that is, individuals do not choose their level of schooling at random), Australian researchers have attempted to circumvent the potential

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<sup>2</sup> The justification for using such an approach comes from the fact that this type of specification can be derived from a simple model where individual decision-makers choose years of schooling to maximise the present discounted value of lifetime net income.

<sup>3</sup> Heckman, Lochner and Todd (2008) highlight the fact that strong assumptions are required to claim that the coefficient on education from a Mincer model can be interpreted as an internal rate of return. These include: (i) there is no direct or psychic costs of schooling; (ii) there are no income taxes; (iii) there is no loss of working life with additional years of schooling; (iv) earnings functions are multiplicatively separable in experience and schooling; and (v) marginal returns to schooling equal average returns to schooling.



endogeneity of the schooling issue by using instrumental variable techniques (for example, Leigh & Ryan 2008), or by using a sample of twins (for example, Miller, Mulvey & Martin 1995, 2005, 2006). Card (1999, 2001) provides a review of the literature and an overview of the econometric challenges in attempting to estimate the causal returns from education.

The general finding in the Australian literature is that the labour market benefits of VET participation are larger for early school leavers than when compared with the outcomes of those who complete school without undertaking further study. In other words, selection of an appropriate comparison group is important in estimating returns. In this report, we build on the previous literature and Ryan (2002b) by providing a comprehensive analysis of the effects of VET qualifications relative to Year 12 completers and those who did not complete Year 12. Overall, Ryan (2002b) found that there was a positive effect of completion of a VET qualification on full-time employment outcomes for individuals, when using individuals who did not complete Year 12 as the basis for comparison. In particular, he found that for males, skilled vocational qualifications and associate diplomas had larger effects on the probability of being employed full-time than basic vocational qualifications. He also found that business courses provided better employment outcomes for both males and females than did other fields.

There have been several Australian studies of changes in the labour market returns from education over time in the past few decades. Coelli and Wilkins (2008) construct estimates of earnings and income differences by education attained over the period 1981–82 to 2003–04. The authors find that the percentage gap in weekly full-time earnings between individuals with non-university post-secondary qualifications (certificates I to IV and undergraduate diplomas) and those with no post-secondary qualifications has remained stable for males (at around 13 %) but have fallen for females over this period from 21% to 8%. This study updated earlier work by Borland (1999), Gregory (1995), Karmel (1994) and others. The earlier work found that earnings gaps for both males and females had fallen over the period from 1968–69 to 1981–82. These studies did not, however, break down the earnings gap by field of education, age of education or even level of education within the broad group of non-university post-secondary education.

Kennedy and Hedley (2003) examine movements over time in labour force participation rates by educational attainment category. The authors find that labour force participation rates of prime-age males fell for all educational attainment groups between 1981 and 2001, but the fall for males with no post-school qualifications was particularly dramatic. Female participation rose over this period for all educational attainment categories, though at a slower rate in the 1990s than in the 1980s. Karmel and Woods (2004) project that, as current relatively well-educated cohorts age, there will be a positive education effect over the next few decades, leading to higher engagement rates with the labour force. If the labour market continues to increase its demand for educated workers, VET qualifications can play an important role in providing lifelong learning and training that are important for maintaining and increasing labour force participation.

# Methodology and data

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The data used for this report are from the ABS Surveys of Education and Training (SET) for 1993, 1997, 2001 and 2005. The surveys employ very large, nationally representative, population samples and were dwelling-based surveys collected through personal interviews.

This report is concerned with estimating a causal return to VET qualifications. It extends the analysis in Ryan (2002b) by examining more waves of SET data (four vs two) and using an alternative statistical procedure known as matching, with the emphasis placed on the creation of appropriate comparison groups.

The strength of these data sets for the purposes of this analysis lies in the extensive information they contain on individual educational attainment. Individuals report details of their three highest post-school qualifications, as well as the age at which they left school and whether they had completed the highest level of schooling possible. The qualification details include the VET provider type (for example, university, technical and further education (TAFE), adult/community education centre etc.), when the qualification was completed, and its field and level. The main disadvantage of these data sets is that they are independent cross-section surveys with no linking of individuals over time. However, the presence of four consecutive data sets with considerable similarities in their scope and collection will allow us to estimate changes over time that are representative of the Australian population. Since we aim to estimate the outcomes of the VET system, for the purposes of our analysis for each of the SET data sets we limit the data to samples of individuals who actually were or conceivably could have been its graduates.

For the 1993 SET data, we:

- ✧ exclude any full-time/part-time students in the survey year
- ✧ exclude anyone with highest qualifications obtained overseas
- ✧ exclude those not born in Australia, or aged < 18 on arrival in Australia

For the 1997, 2001 and 2005 Survey of Education and Training data, we:

- ✧ exclude any full-time/part-time students in the survey year
- ✧ exclude anyone with highest qualifications obtained overseas
- ✧ exclude those not born in Australia, or aged < 15 on arrival in Australia.

Unfortunately, the change in the categories for age of immigration after the 1993 survey did not allow us to continue to use less than age 18 years as the cut-off. It is also worth noting that these later years of survey data expanded the scope of the population surveyed, and include, for example, those not in the labour force. In order to make the survey sample in the 1997, 2001 and 2005 SET data comparable with the 1993 SET data, for these three data sets we only include:

- ✧ wage or salary earner in past 12 months
- ✧ employers, self-employed at survey date
- ✧ individuals unemployed or marginally attached to the labour force.

Note also that the surveys cover members of private dwellings only, not members of group dwellings (hotels, hostels etc.).<sup>4</sup>

The analysis in this report is performed for each of the four years of survey data listed above. By attempting to estimate returns from VET in each of the four years using a comparable sample of the population, we hope to determine if there have been changes over time in the returns from VET.

No attempts will be made to provide estimates of the costs of obtaining educational qualifications and internal rates of return. Our empirical strategy for estimating the returns from VET is to use the method of propensity-score-matching to pre-process the data before applying standard regression analysis, in order to make less model-dependent causal inferences (for example, see Ho et al. 2007).

This involves conducting a two-stage analysis rather than matching in a single step on a single set of covariates. This approach is necessary because our treatment comparison group assignment variable in the Survey of Education and Training data (VET vs no VET) is retrospective and we cannot use variables measured after the decision on whether to undertake VET has been made (for example, current marital status) to predict the probability of undertaking VET.

In the first step, matching is done using covariates that can plausibly affect the decision to undertake VET. In the second step, we use an augmented set of variables for the regression analysis—variables from the first step, the weights obtained from matching in the first step, and variables that might plausibly affect the outcome of interest (but not the decision to undertake VET). This combination of matching and regression using appropriate comparison groups helps us to obtain estimates of the effects of VET qualifications.

The two-step statistical procedure we undertake is best explained using a simple example. Suppose there are 2000 people with certificate III/IV (the treatment group) and 8000 people with no qualifications (the comparison group). While ordinary regression analysis will simply use the entire sample of 10 000 to estimate the effect of having certificate III/IV qualifications, matching in the first step will first help to eliminate the least comparable comparison group members. Suppose in this case that with nearest neighbour matching, only 1500 of the 8000 comparison group members are kept in the sample (with some being paired with more than one treatment group member; this technique is known as ‘matching with replacement’). In other words, the total sample size now is not 10 000 but 3500 (that is, 2000 + 1500). The second stage regression is then performed for this smaller sample, with some comparison group members having weights greater than one if they are paired with more than one treatment group member. Comparison group members who are not used are essentially given weights of zero. The idea of using only comparable people in the statistical analysis is an attempt to mimic a randomised experiment.

The manner in which matching attempts to eliminate selection bias is explained in more detail in appendix A. Details on the variables used in the first and second stages are provided in appendix B.

## Defining the treatment and comparison groups

In attempting to estimate the returns from different levels of VET qualifications, different treatment/comparison group pairs will be assembled in the Survey of Education and Training data. These are based on information regarding the highest level of qualification obtained. The

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<sup>4</sup> According to the ABS 2006 Census of Population and Housing, less than 0.5% of dwellings were non-private dwellings. The Survey of Education and Training sample restriction to private dwellings should therefore not be expected to significantly affect the generalisation of results in this study to the wider Australian population.

comparisons are partly driven by the categories available in the data. For example, even though it would be interesting to split up certificate III and IV qualifications, this is not possible as both qualifications were recorded as one category in the Survey of Education and Training data.

For the 1993 and 1997 Surveys of Education and Training, prior to the introduction of the Australian Qualifications Framework, four different treatment groups ( $D = 1$ ) will be created:

- ✧ bachelor degree and above
- ✧ associate diploma
- ✧ skilled vocational qualifications
- ✧ basic vocational qualifications.

Individuals with undergraduate diplomas in the 1993 and 1997 Surveys of Education and Training are excluded from our analyses in order to use a consistent definition of the highest level of educational attainment for the period 1993–2005.

These treatment groups will each be compared with two comparison groups ( $D = 0$ ):

- ✧ school completers (= Year 12)
- ✧ did not complete schooling (< Year 12).

For the 2001 and 2005 Surveys of Education and Training, after the Australian Standard Classification of Education (ASCED) replaced the Australian Bureau of Statistics Classification of Qualifications (ABSCQ), the following different treatment groups will be created:

- ✧ bachelor degree and above
- ✧ advanced diploma/diploma
- ✧ certificate III/IV
- ✧ certificate I/II.

As with the 1993 and 1997 Surveys of Education and Training, these treatment groups will be compared against Year 12 completers and non-school completers.

The 2001 Survey of Education and Training data are unique in that they report education level using both the Australian Bureau of Statistics Classification of Qualifications and Australian Standard Classification of Education. This allows the returns from VET to be estimated in 2001 using both classification schemes and enables some inferences to be made regarding the differences the change in classification makes (for example, from skilled vocational qualifications to certificate III/IV)

In addition, returns from VET will also be estimated separately by fields of study. For the 1993 SET, these fields are:

- ✧ business
- ✧ engineering, architecture, building, automotive
- ✧ other.

For the 1997, 2001 and 2005 Surveys of Education and Training, these fields are:

- ✧ business
- ✧ engineering, architecture, building
- ✧ other.

The logic driving the use of these field of education categories is that it separates out the traditional trades from other fields.

## Sample sizes

At the most basic level and abstracting from more complicated econometric issues, an ability to make reliable statistical inferences from a sample of a population is highly dependent on whether appropriately large sample sizes are available. The raw sample sizes of each treatment and comparison group used in the analysis are provided in appendix C. These sample sizes are derived after the restrictions described earlier in this section are imposed on the Survey of Education and Training data. Note that the sample sizes here and those used in the multivariate analysis in the ‘Defining the outcome variables’ section might differ slightly, depending on the number of missing values in outcomes and covariates.

Groups that have fewer than 100 people ( $n < 100$ ) are denoted in italics, indicating that the resulting impact estimates for those groups should be interpreted with caution. In general, engineering/construction is male-dominated, other fields (for example, health, education, creative arts, hospitality etc.) are female-dominated, while business tends to have a roughly equal representation of both genders.

## Defining the outcome variables

With the statistical approach taken for this analysis, careful attention was first placed on defining the appropriate treatment and comparison groups and the set of covariates to be used. This has been deliberate and is an advantage of the statistical approach used in this study. In this way, no systematic biases on outcomes should result, as we do not repeatedly experiment with different regression specifications and samples in attempts to find the set of results that most suits our priors.

The four outcomes we examine in the Survey of Education and Training data are:

- 1 employment (1 = employed, 0 = unemployed or marginally attached to the labour force)
- 2 working full-time (conditional on working full-time or part-time, 1 = worked 35 or more hours per week with main period employer, 0 = worked less than 35 hours per week with main period employer)
- 3 permanent vs casual employee (conditional on working, 1 = permanent employee, 0 = casual employee)<sup>5</sup>
- 4 weekly earnings (conditional on working full-time, using mid-points of the intervals of reported weekly wages so it can be analysed in the same manner as a continuous variable).

For weekly earnings, it was necessary to impute values for the top category because the ABS top-coded high values of earnings for confidentiality purposes. Based on assuming a log-normal distribution of wages for each of the Survey of Education and Training years, we used the following imputations.

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<sup>5</sup> In the 2001 SET, this distinction is made based on whether employees had leave entitlements.

**Table 1 Imputation rules for top category values of weekly earnings**


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<b>1993 SET</b>	
Males	> \$1160 = \$1401
Females	> \$1160 = \$1338
<b>1997 SET</b>	
Males	> \$1160 = \$1430
Females	> \$1160 = \$1323
<b>2001 SET</b>	
Males	> \$1160 = \$1468
Females	> \$1160 = \$1380
<b>2005 SET</b>	
Males	> \$2000 = \$2422
Females	> \$2000 = \$2291

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## Descriptive statistics

The means of the covariates for the various treatment and comparison groups for each of the Survey of Education and Training data sets are assembled in table 2. Covariate means for the four treatment groups (bachelor degree and above, associate diploma, skilled vocational qualifications or certificate III/IV, basic vocational qualifications or certificate I/II) are provided in the first four columns of each panel, while covariate means for the two comparison groups (Year 12 and less than Year 12) are given in the last two columns.

A cursory glance at any of the panels in table 2 would be sufficient to make clear that there are many differences in characteristics across groups of persons with different educational qualifications. For example, when comparing individuals with a bachelor degree and above (the treatment group) with individuals with a Year 12 education (the comparison group) in the 1993 Survey of Education and Training, it becomes clear that the age distribution in the two groups is quite different. The treatment group is older on average as there is a significantly smaller proportion of individuals with a bachelor degree and above in the 20 to 24 years age group (0.095 vs 0.214). This difference is not unexpected, given that most people graduate with a bachelor's degree in their early twenties.

The treatment groups are more likely to reside in a capital city and more likely to be married than the comparison groups. Persons with the lowest educational qualifications (Year 12, less than Year 12) have slightly higher proportions of individuals with English as the first language, when compared with those with higher qualifications. This could be an indication that language is not a huge barrier with regards to educational attainment in the Australian context, and also perhaps reflects the notion that children of immigrants tend to place a high priority on education. In all of the Survey of Education and Training years, there is a smaller proportion of native English speakers in the bachelor degree and above group than in the less than Year 12 group.

In addition, it is also apparent that there is a natural kind of gender sorting into the sub-diploma VET qualifications. In all of the Survey of Education and Training years, males are more likely to have skilled vocational or certificate III/IV qualifications, whereas females are more likely to have basic vocational or certificate I/II qualifications.

Differences in covariates for each of the Survey of Education and Training years could be driven by differences in the core characteristics of persons with different educational qualifications. They could also be the result of the sampling scheme. As a person's chance of selection in the survey

varied depending on the state or territory or, in some cases, area of state/territory in which they lived, differences in characteristics of survey respondents could therefore also be related to educational qualifications if certain areas had a higher proportion of people with certain qualifications. If we were solely interested in describing differences in the characteristics across these groups, it would be important to take into account the method of sample selection and to use the corresponding sample weights to adjust for this. However, for our purposes, as we are primarily interested in using multivariate statistical techniques to make the treatment and comparison groups similar on average, such weighting is not necessary. The covariate differences across groups in table 2 therefore should not be interpreted as representing the average characteristics of persons with each educational qualification in the Australian population. Its primary purpose is simply to document the fact that the groups are quite different before we perform any statistical adjustment.

**Table 2 Covariate means for the treatment and comparison groups**

<b>1993 SET (ABSCQ)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Age 20–24	0.095	0.095	0.116	0.154	0.214	0.110
Age 25–29	0.133	0.139	0.147	0.156	0.152	0.120
Age 30–34	0.176	0.157	0.156	0.137	0.129	0.132
Age 35–39	0.202	0.153	0.146	0.154	0.129	0.123
Age 40–44	0.144	0.149	0.135	0.139	0.103	0.126
Age 45–49	0.108	0.129	0.113	0.093	0.077	0.126
Age 50–54	0.075	0.080	0.086	0.068	0.041	0.093
Age 55–64	0.067	0.091	0.096	0.054	0.046	0.117
Male	0.529	0.688	0.836	0.213	0.503	0.478
Capital city	0.770	0.691	0.592	0.648	0.682	0.581
Non-English speaking country	0.079	0.077	0.062	0.061	0.087	0.087
English is first language	0.892	0.904	0.924	0.910	0.891	0.901
NSW	0.231	0.260	0.253	0.300	0.185	0.198
Vic.	0.214	0.218	0.201	0.160	0.228	0.209
QLD	0.133	0.157	0.194	0.163	0.172	0.205
SA	0.114	0.119	0.109	0.123	0.131	0.123
WA	0.124	0.106	0.114	0.123	0.126	0.136
Married	0.674	0.731	0.729	0.663	0.533	0.674
Child aged 0–2	0.163	0.128	0.142	0.134	0.126	0.117
Child aged 3–4	0.057	0.062	0.055	0.057	0.050	0.053
Child aged 5–9	0.101	0.106	0.103	0.113	0.081	0.101
Child aged 10–14	0.081	0.110	0.095	0.092	0.063	0.096
Union member	0.367	0.258	0.274	0.214	0.244	0.231

Note: ABSCQ = Australian Bureau of Statistics Classification of Qualifications.

<b>1997 SET (ABSCQ)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Age 20–24	0.099	0.160	0.099	0.140	0.234	0.075
Age 25–29	0.151	0.166	0.136	0.141	0.164	0.122
Age 30–34	0.134	0.146	0.169	0.138	0.122	0.125
Age 35–39	0.164	0.139	0.162	0.147	0.121	0.141
Age 40–44	0.166	0.124	0.125	0.136	0.100	0.137
Age 45–49	0.128	0.115	0.111	0.114	0.070	0.131
Age 50–54	0.094	0.086	0.094	0.080	0.044	0.108
Age 55–64	0.043	0.038	0.067	0.048	0.020	0.068
Male	0.021	0.022	0.030	0.021	0.012	0.034
Capital city	0.501	0.514	0.879	0.396	0.522	0.486
Non-English speaking country	0.898	0.886	0.930	0.919	0.897	0.927
English is first language	0.065	0.054	0.041	0.045	0.058	0.048
NSW	0.230	0.267	0.205	0.271	0.200	0.184
Vic.	0.234	0.200	0.191	0.167	0.220	0.184
QLD	0.166	0.168	0.214	0.188	0.211	0.219
SA	0.096	0.128	0.119	0.120	0.096	0.139
WA	0.105	0.112	0.129	0.129	0.123	0.132
Married	0.679	0.616	0.737	0.656	0.525	0.676
Child aged 0–2	0.139	0.141	0.170	0.124	0.129	0.114
Child aged 3–4	0.053	0.054	0.052	0.052	0.034	0.057
Child aged 5–9	0.104	0.065	0.093	0.114	0.080	0.110
Child aged 10–14	0.116	0.094	0.095	0.109	0.067	0.101
Union member	0.311	0.254	0.233	0.206	0.211	0.207
Has disability	0.144	0.214	0.229	0.235	0.160	0.245

Note: ABSCQ = Australian Bureau of Statistics Classification of Qualifications.



<b>2001 SET (ABSCQ)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Age 20–24	0.084	0.088	0.088	0.110	0.177	0.066
Age 25–29	0.140	0.182	0.133	0.131	0.190	0.087
Age 30–34	0.147	0.123	0.147	0.127	0.157	0.113
Age 35–39	0.142	0.133	0.144	0.135	0.119	0.149
Age 40–44	0.145	0.146	0.161	0.150	0.106	0.143
Age 45–49	0.136	0.139	0.117	0.111	0.073	0.133
Age 50–54	0.124	0.079	0.095	0.113	0.050	0.122
Age 55–64	0.055	0.074	0.078	0.062	0.027	0.086
Male	0.027	0.031	0.030	0.030	0.008	0.043
Capital city	0.484	0.548	0.811	0.330	0.516	0.484
Non-English speaking country	0.915	0.894	0.927	0.920	0.910	0.931
English is first language	0.052	0.067	0.042	0.045	0.055	0.050
NSW	0.220	0.252	0.202	0.236	0.182	0.190
Vic.	0.235	0.201	0.200	0.175	0.221	0.191
QLD	0.156	0.170	0.202	0.191	0.224	0.206
SA	0.114	0.100	0.125	0.143	0.109	0.143
WA	0.116	0.119	0.140	0.132	0.130	0.138
Father born overseas	0.309	0.304	0.289	0.279	0.289	0.256
Mother born overseas	0.268	0.277	0.246	0.248	0.274	0.232
Married	0.692	0.718	0.718	0.677	0.580	0.668
Child aged 0–2	0.131	0.131	0.129	0.111	0.140	0.103
Child aged 3–4	0.046	0.056	0.060	0.062	0.057	0.054
Child aged 5–9	0.100	0.101	0.125	0.110	0.097	0.112
Child aged 10–14	0.097	0.090	0.087	0.106	0.063	0.107
Union member	0.273	0.190	0.194	0.135	0.157	0.162
Has disability	0.178	0.259	0.270	0.275	0.212	0.320

Note: ABSCQ = Australian Bureau of Statistics Classification of Qualifications.

<b>2001 SET (ASCED)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Age 20–24	0.082	0.067	0.087	0.101	0.175	0.065
Age 25–29	0.138	0.131	0.138	0.139	0.189	0.085
Age 30–34	0.145	0.129	0.138	0.133	0.157	0.113
Age 35–39	0.141	0.116	0.147	0.135	0.119	0.149
Age 40–44	0.147	0.159	0.161	0.140	0.108	0.143
Age 45–49	0.137	0.133	0.121	0.111	0.073	0.134
Age 50–54	0.127	0.126	0.094	0.118	0.051	0.123
Age 55–64	0.055	0.094	0.076	0.065	0.028	0.087
Male	0.027	0.038	0.030	0.032	0.009	0.043
Capital city	0.476	0.456	0.760	0.331	0.516	0.485
Non-English speaking country	0.916	0.904	0.923	0.910	0.911	0.931
English is first language	0.052	0.058	0.046	0.053	0.055	0.049
NSW	0.220	0.237	0.208	0.239	0.183	0.190
Vic.	0.235	0.203	0.204	0.173	0.223	0.190
QLD	0.157	0.177	0.196	0.196	0.222	0.206
SA	0.113	0.112	0.125	0.132	0.108	0.143
WA	0.114	0.141	0.138	0.136	0.130	0.137
Father born overseas	0.307	0.290	0.289	0.288	0.286	0.256
Mother born overseas	0.268	0.255	0.249	0.254	0.272	0.232
Married	0.693	0.723	0.719	0.682	0.579	0.670
Child aged 0–2	0.130	0.112	0.126	0.119	0.139	0.103
Child aged 3–4	0.045	0.061	0.060	0.060	0.057	0.053
Child aged 5–9	0.101	0.096	0.125	0.108	0.098	0.112
Child aged 10–14	0.097	0.105	0.090	0.107	0.063	0.108
Union member	0.276	0.204	0.195	0.122	0.158	0.162
Has disability	0.182	0.217	0.272	0.277	0.210	0.320

Note: ASCED = Australian Standard Classification of Education.

2005 SET (ASCED)	Bachelor's degree and above	Associate diploma	Skilled vocational qualifications	Basic vocational qualifications	Year 12	Less than Year 12
Age 20–24	0.063	0.064	0.092	0.075	0.161	0.070
Age 25–29	0.113	0.090	0.115	0.074	0.157	0.066
Age 30–34	0.160	0.134	0.138	0.132	0.154	0.081
Age 35–39	0.139	0.135	0.139	0.147	0.120	0.137
Age 40–44	0.132	0.160	0.134	0.150	0.090	0.147
Age 45–49	0.160	0.148	0.144	0.152	0.085	0.141
Age 50–54	0.114	0.101	0.105	0.105	0.061	0.130
Age 55–64	0.080	0.108	0.084	0.091	0.042	0.109
Male	0.039	0.058	0.039	0.041	0.016	0.067
Capital city	0.456	0.462	0.697	0.374	0.546	0.511
Non-English speaking country	0.930	0.934	0.962	0.936	0.929	0.960
English is first language	0.066	0.059	0.041	0.056	0.061	0.045
NSW	0.204	0.231	0.218	0.287	0.183	0.208
Vic.	0.241	0.212	0.187	0.184	0.213	0.184
QLD	0.178	0.193	0.230	0.169	0.228	0.208
SA	0.107	0.124	0.124	0.118	0.121	0.142
WA	0.117	0.124	0.121	0.125	0.131	0.125
Father born overseas	0.306	0.311	0.264	0.273	0.303	0.244
Mother born overseas	0.270	0.290	0.226	0.240	0.274	0.221
Married	0.731	0.727	0.713	0.691	0.568	0.656
Child aged 0–2	0.144	0.100	0.115	0.096	0.126	0.083
Child aged 3–4	0.049	0.038	0.049	0.048	0.054	0.043
Child aged 5–9	0.105	0.122	0.103	0.112	0.085	0.103
Child aged 10–14	0.097	0.106	0.096	0.115	0.067	0.098
Union member	0.278	0.211	0.197	0.157	0.159	0.170
Has disability	0.165	0.223	0.270	0.272	0.183	0.322

Notes: ASCED = Australian Standard Classification of Education.

Omitted groups in the covariates are age 15–19, ACT, NT and Tas., and have no children.

# Results

Because assignment to either the treatment or comparison group is random in a randomised experiment, characteristics of both groups will be on average very similar. Both groups would be similar in age, have a similar proportion of males, a similar proportion from each state etc. The only difference is that one group is exposed to the treatment, and the other is not. As a result of this similarity, taking the simple difference in outcomes between the two groups without any adjustments for covariates can be interpreted as an average effect of the treatment (which in our context, would be the higher educational qualification).

However, in the case of non-experimental data like the Survey of Education and Training, as seen in the previous section, it is unlikely that the two groups will be similar in terms of characteristics. As such differences in group characteristics exist, it is therefore not likely that a simple comparison in group outcomes can be meaningfully interpreted as a causal effect. Any differences in group outcomes could be the result of the treatment, or due to differences in characteristics of the groups and how this affects the way they respond to the treatment. The role of the multivariate approach used in this section (discussed in the previous section) is to statistically control for differences in such characteristics, so that the remaining differences in outcomes are purged of any bias resulting from these differences in characteristics.

Before proceeding to the results of the multivariate analysis, we first provide the raw or unadjusted mean values of the outcome variables for each of the treatment and comparison groups (table 3).

Across all the years where Survey of Education and Training data are available (table 3), it is clear that persons with a bachelor degree and above are more likely than all other groups to be employed, more likely to be in permanent employment, and to have relatively higher earnings. It is not always the case, however, that persons with a bachelor degree and above are more likely to be working full-time. In 1993, 1997 and 2001, for example, a higher proportion of persons with associate diploma qualifications were more likely to be working full-time.

**Table 3 Unadjusted mean outcomes for the treatment and comparison groups**

<b>1993 SET (ABSCQ)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Employment	0.934	0.904	0.893	0.808	0.820	0.747
Full-time/part-time employment	0.816	0.863	0.884	0.633	0.771	0.727
Permanent/casual employment	0.853	0.826	0.822	0.717	0.738	0.703
Weekly earnings	804.892	665.684	587.315	516.663	539.961	500.827

Note: ABSCQ = Australian Bureau of Statistics Classification of Qualifications.

<b>1997 SET (ABSCQ)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Employment	0.939	0.888	0.918	0.834	0.872	0.778
Full-time/part-time employment	0.685	0.755	0.662	0.593	0.643	0.572
Permanent/casual employment	0.858	0.814	0.810	0.710	0.721	0.670
Weekly earnings	908.168	725.376	693.750	622.964	624.914	579.719

Note: ABSCQ = Australian Bureau of Statistics Classification of Qualifications.

<b>2001 SET (ABSCQ)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Employment	0.946	0.907	0.918	0.822	0.870	0.778
Full-time/part-time employment	0.654	0.662	0.612	0.523	0.643	0.549
Permanent/casual employment	0.859	0.783	0.779	0.686	0.733	0.660
Weekly earnings	1050.574	874.203	791.066	691.535	746.026	679.282

Note: ABSCQ = Australian Bureau of Statistics Classification of Qualifications.

<b>2001 SET (ASCED)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Employment	0.944	0.904	0.914	0.811	0.870	0.779
Full-time/part-time employment	0.651	0.605	0.605	0.527	0.643	0.548
Permanent/casual employment	0.857	0.816	0.774	0.676	0.735	0.662
Weekly earnings	1047.992	917.076	793.095	689.913	748.234	680.820

Note: ASCED = Australian Standard Classification of Education.

<b>2005 SET (ASCED)</b>	<b>Bachelor's degree and above</b>	<b>Associate diploma</b>	<b>Skilled vocational qualifications</b>	<b>Basic vocational qualifications</b>	<b>Year 12</b>	<b>Less than Year 12</b>
Employment	0.948	0.917	0.930	0.844	0.891	0.830
Full-time/part-time employment	0.639	0.581	0.620	0.563	0.620	0.551
Permanent/casual employment	0.849	0.801	0.767	0.743	0.712	0.695
Weekly earnings	1271.755	1052.036	937.946	853.945	878.638	807.583

Note: ASCED = Australian Standard Classification of Education.

We now present treatment/comparison group differences after statistically adjusting for differences in characteristics. These results are the main results from this report and are our estimates of the returns from education based on the Survey of Education and Training data. Note that the estimates of returns in this section are based on cross-sectional data represent average returns. This is because these estimates are derived from individuals of various ages who might have obtained their qualifications a long time ago or only more recently. For example, the earnings premium of persons with diplomas over Year 12 completers should not be interpreted as the immediate effect on earnings one should expect from obtaining a diploma. Instead, it should be interpreted as an average earnings premium over an individual's working life.

## Returns by aggregate level of qualifications, Year 12 as comparison group

Tables 4 to 13 provide estimates of the private returns from education in terms of employment and earnings outcomes, using individuals who completed 12 years of schooling as the comparison group. The estimates are provided separately by Survey of Education and Training year and gender. At this point, the focus is on educational qualifications prior to being broken down by field of education. The more disaggregated results by field of education using individuals who completed 12 years of schooling as the comparison group are presented later.

The estimates in these tables are the mean differences in outcomes between the respective treatment and comparison groups after accounting for differences in their characteristics. For the three outcomes—employment, full-time/part-time employment, and permanent/casual employment—such differences can simply be interpreted as the percentage point increase or decrease in outcomes one would expect as a result of experiencing the treatment. For the fourth outcome that is examined—weekly earnings—the outcome is first transformed by taking logs, a conventional practice in the education literature that has theoretical justifications. For example, in table 4, in the first row, average log weekly earnings of persons with a bachelor degree and above is 0.292 log points higher than persons with a Year 12 qualification. As the log earnings specification allows an interpretation of returns in percentage terms using a simple re-transformation, it can also be more usefully inferred that persons with a bachelor degree or more earned 33.9% more than persons with only Year 12 qualifications.<sup>6</sup>

When comparisons are made relative to having a Year 12 qualification, the results in tables 4 to 13 make it clear that by obtaining a bachelor's degree or higher, and to a lesser extent an associate diploma (ABSCQ) or an advanced diploma/diploma (ASCED), individuals can generally expect to be more likely to be employed, to be in full-time employment, to be in permanent employment, and to have higher weekly earnings. For example, looking at the results based on the 1997 SET for males in table 6, persons with associate diplomas are 12.9 percentage points more likely to be employed than persons with a Year 12 qualification. They are also earning on average 0.068 log points more (7.0%).

On the other hand, there is no evidence to suggest in tables 4 to 13 that obtaining basic and skilled vocational qualifications (ABSCQ) or certificate I/II and III/IV qualifications (ASCED) confers any positive labour market outcomes, relative to having a Year 12 qualification. In most cases, the estimated impacts are negative, which suggests that such qualifications actually lead to relatively worse outcomes. For example, in the 2001 Survey of Education and Training in table 10, males with certificate I/II qualifications earned 10.0% less per week on average than males with Year 12 qualifications. For females in the 2001 Survey of Education and Training (table 11) with certificate I/II qualifications, their earnings were 9.1% less per week on average than females with Year 12 qualifications.

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<sup>6</sup> Percentage effects are computed using the standard calculation:  $100*(e^{\beta}-1)$ .

## Returns under the ABSCQ and ASCED frameworks

Recall that the 2001 Survey of Education and Training data are unique in that they report education level using both the ABSCQ and the ASCED. According to the former, released in 2001, the following correspondence levels between the two exist:

<b>ABSCQ</b>	<b>ASCED</b>
Bachelor degree	Bachelor (honours) degree Bachelor (pass) degree
Undergraduate diploma	Advanced diploma
Associate diploma	Diploma Certificate IV
Skilled vocational qualifications	Certificate III
Basic vocational qualifications	Certificate II

Due to the way educational categories are grouped together in the Survey of Education and Training (refer to 'Defining the treatment and comparison groups' in the methodology section), we are not able to precisely use the correspondence proposed by ABS in our analysis. A comparison of the impact estimates based on ABSCQ and ASCED classification schemes should therefore take this into consideration.

For bachelor degrees and above, both schemes essentially use a similar definition, and this is reflected in that fact that the sample sizes and impact estimates on the four outcomes are similar under either ABSCQ or ASCED. As our advanced diploma/diploma grouping under ASCED is of a higher qualification level than the associate diploma grouping under ABSCQ (because we include advanced diploma holders in ASCED grouping), we would expect the impacts to be relatively higher when we use our ASCED definition. Indeed, looking at the comparative results in tables 8 to 11, where the impacts are significant, one can see that the impacts on permanent employment and average weekly earnings are higher in table 10 than they are in table 8.

Similarly, as our certificate III/IV grouping under ASCED is of a higher qualification level than the skilled vocation qualification grouping under ABSCQ (because certificate IV is of a higher level than skilled vocational qualifications), we also expect impacts to be larger when ASCED is used. However, the results in tables 8 to 11 do not provide strong evidence that this is the case, and the impacts appear to be very similar. This could possibly be an indication that the labour market does not sufficiently distinguish certificate IV qualifications from certificate III qualifications.

Turning to the lowest qualification level, the basic vocational qualification grouping under ABSCQ is comparatively superior to the certificate I/II grouping we use under ASCED because it omits individuals with certificate I qualifications. Comparing the results in tables 8 to 11, although the impacts are all negative relative to Year 12 completers, it can be seen that under the ABSCQ scheme, they are slightly less negative.

## Returns over time

Have the returns from VET qualifications changed over time from 1993 to 2005? Focusing first on the group with bachelor degrees and above to establish a benchmark, it can be seen that the average weekly earnings premium relative to Year 12 completers has remained somewhat stable. For males (females), the premium was 33.9% (25.7%) in 1993, 27.5% (31.8%) in 1997, 29.3% (30.1%) in 2001 and 32.0% (37.9%) in 2005, where the premium is expressed relative to the average earnings of matched Year 12 completers.

The earnings premium for male associate diploma holders relative to Year 12 completers in 1993 was 7.8% and 7.0% in 1997. The earnings premium for females in both 1993 and 1997 was not significantly different from zero. With the introduction of ASCED, which replaced the ABSCQ, and our grouping of diploma and advanced diploma holders into one category, we find that there is an increase in the earnings premium. In 2001, for males (females), the premiums were 13.4% (2.9%) and in 2005, they were 7.4% (12.0%). Some of these increases are most likely to be due to the effects of the credential re-labelling and our method of grouping (see the earlier discussion comparing the 2001 results in tables 8 to 11 under the alternative classification schemes, ABSCQ or ASCED).

**Table 4 Aggregate returns from education for the 1993 SET (ABSCQ) relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.036*** (0.002)	0.006 (0.617)	0.032** (0.046)	0.292*** (0.000)
Number of observations	1787	1740	1465	1204
Associate diploma	0.032* (0.051)	0.018 (0.238)	0.024 (0.263)	0.075*** (0.008)
Number of observations	1085	1044	812	664
Skilled vocational qualifications	-0.005 (0.547)	0.016** (0.046)	0.010 (0.421)	-0.028* (0.053)
Number of observations	4294	4062	3029	2380
Basic vocational qualifications	-0.021 (0.462)	0.003 (0.931)	-0.025 (0.515)	0.069 (0.157)
Number of observations	425	399	349	240

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 5 Aggregate returns from education for the 1993 SET (ABSCQ) relative to Year 12 completers, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.105*** (0.000)	0.033 (0.163)	0.047** (0.025)	0.299*** (0.000)
Number of observations	1590	1485	1425	858
Associate diploma	0.065* (0.056)	0.042 (0.325)	-0.040 (0.350)	-0.036 (0.490)
Number of observations	493	430	398	222
Skilled vocational qualifications	0.058** (0.029)	-0.013 (0.713)	-0.010 (0.771)	0.057* (0.098)
Number of observations	844	724	615	278
Basic vocational qualifications	0.030 (0.124)	-0.045* (0.074)	0.018 (0.463)	0.003 (0.916)
Number of observations	1574	1294	1240	554

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 6 Aggregate returns from education for the 1997 SET (ABSCQ) relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.039*** (0.000)	0.066*** (0.000)	0.077*** (0.000)	0.243*** (0.000)
Number of observations	2036	1968	1642	1423
Associate diploma	0.025 (0.265)	0.129*** (0.000)	0.050* (0.098)	0.068** (0.041)
Number of observations	570	550	496	438
Skilled vocational qualifications	0.015* (0.090)	-0.002 (0.904)	0.021 (0.170)	-0.072*** (0.000)
Number of observations	3491	3386	2446	2186
Basic vocational qualifications	-0.039** (0.010)	0.013 (0.558)	-0.010 (0.665)	-0.041 (0.107)
Number of observations	1557	1444	1142	982

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 7 Aggregate returns from education for the 1997 SET (ABSCQ) relative to Year 12 completers, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.046*** (0.001)	0.046** (0.030)	0.049** (0.011)	0.276*** (0.000)
Number of observations	2019	1888	1797	1116
Associate diploma	-0.010 (0.737)	0.060 (0.148)	0.003 (0.929)	0.022 (0.507)
Number of observations	535	484	483	292
Skilled vocational qualifications	-0.030 (0.356)	-0.115** (0.013)	-0.070 (0.147)	-0.142*** (0.001)
Number of observations	480	411	348	166
Basic vocational qualifications	-0.043*** (0.003)	-0.002 (0.907)	-0.032 (0.120)	-0.051*** (0.001)
Number of observations	2371	2014	1883	970

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 8 Aggregate returns from education for the 2001 SET (ABSCQ) relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.025*** (0.006)	-0.010 (0.577)	0.058*** (0.000)	0.254*** (0.000)
Number of observations	2284	2242	1789	1591
Associate diploma	-0.006 (0.778)	0.027 (0.424)	-0.021 (0.498)	0.055* (0.094)
Number of observations	670	633	521	474
Skilled vocational qualifications	-0.004 (0.580)	-0.072*** (0.000)	-0.026* (0.083)	-0.074*** (0.000)
Number of observations	3534	3416	2410	2145
Basic vocational qualifications	-0.056*** (0.005)	-0.068** (0.025)	-0.079** (0.011)	-0.095*** (0.002)
Number of observations	952	862	687	545

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 9 Aggregate returns from education for the 2001 SET (ABSCQ) relative to Year 12 completers, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.067*** (0.000)	0.027 (0.161)	0.065*** (0.000)	0.274*** (0.000)
Number of observations	2407	2276	2141	1308
Associate diploma	0.050* (0.072)	0.029 (0.455)	0.059 (0.146)	0.049 (0.148)
Number of observations	549	500	472	268
Skilled vocational qualifications	-0.029 (0.233)	-0.044 (0.191)	-0.067* (0.060)	-0.143*** (0.000)
Number of observations	826	706	635	339
Basic vocational qualifications	-0.024 (0.150)	-0.013 (0.555)	-0.023 (0.344)	-0.071*** (0.004)
Number of observations	1918	1593	1432	713

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 10 Aggregate returns from education for the 2001 SET (ASCED) relative to Year 12 completers, males**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Bachelor degree and above	0.027*** (0.002)	-0.008 (0.664)	0.044*** (0.002)	0.257*** (0.000)
Number of observations	2290	2247	1801	1591
Advanced diploma/diploma	-0.016 (0.327)	0.034 (0.230)	0.045* (0.070)	0.126*** (0.000)
Number of observations	992	938	780	687
Certificate III/IV	0.000 (0.957)	-0.093*** (0.000)	-0.042*** (0.003)	-0.074*** (0.000)
Number of observations	3878	3754	2655	2361
Certificate I/II	-0.068*** (0.002)	-0.042 (0.201)	-0.056 (0.103)	-0.105*** (0.002)
Number of observations	825	741	600	478

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 11 Aggregate returns from education for the 2001 SET (ASCED) relative to Year 12 completers, females**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Bachelor degree and above	0.067*** (0.000)	0.041** (0.033)	0.067*** (0.000)	0.263*** (0.000)
Number of observations	2488	2344	2203	1338
Advanced diploma/diploma	0.026 (0.168)	0.020 (0.456)	0.045* (0.095)	0.029 (0.269)
Number of observations	1174	1068	957	490
Certificate III/IV	-0.013 (0.502)	-0.040 (0.142)	-0.048* (0.091)	-0.096*** (0.000)
Number of observations	1232	1065	979	505
Certificate I/II	-0.031* (0.085)	-0.017 (0.498)	-0.045* (0.079)	-0.095*** (0.000)
Number of observations	1656	1364	1213	612

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 12 Aggregate returns from education for the 2005 SET (ASCED) relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.035*** (0.000)	0.056*** (0.003)	0.059*** (0.000)	0.278*** (0.000)
Number of observations	2262	2213	1905	1578
Advanced diploma/diploma	0.047*** (0.002)	0.017 (0.551)	0.030 (0.270)	0.071** (0.017)
Number of observations	1022	990	833	649
Certificate III/IV	0.036*** (0.000)	-0.005 (0.720)	-0.009 (0.564)	-0.036** (0.030)
Number of observations	3586	3482	2729	2228
Certificate I/II	-0.011 (0.616)	0.054 (0.103)	0.021 (0.522)	-0.070** (0.050)
Number of observations	788	742	582	527

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 13 Aggregate returns from education for the 2005 SET (ASCED) relative to Year 12 completers, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.038*** (0.000)	0.039** (0.029)	0.091*** (0.000)	0.321*** (0.000)
Number of observations	2706	2576	2336	1417
Advanced diploma/diploma	0.013 (0.472)	0.020 (0.464)	0.054** (0.049)	0.113*** (0.000)
Number of observations	1195	1080	932	511
Certificate III/IV	0.030* (0.069)	0.003 (0.901)	0.066** (0.011)	-0.036 (0.119)
Number of observations	1553	1408	1205	672
Certificate I/II	-0.041** (0.030)	-0.012 (0.674)	0.035 (0.219)	-0.021 (0.481)
Number of observations	1325	1116	960	481

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Returns by aggregate level of qualifications, less than Year 12 as comparison group

In this section, instead of using persons with Year 12 qualifications as the comparison group, we use persons with less than a Year 12 qualification. The motivation for using this alternative comparison group is to highlight what differences in labour market outcomes persons with less than 12 years of schooling might expect if they obtained VET qualifications or obtained other higher qualifications.

Tables 14 to 23 provide the corresponding estimates for each of the Survey of Education and Training years. These tables correspond directly with tables 4 to 13, the only difference being that a different comparison group is being used. Not surprisingly, we see that when comparisons are made to a relatively less educated group, the expected returns from VET and other higher qualifications are higher. Unlike before, it now appears that obtaining sub-diploma VET qualifications also leads to beneficial outcomes. For example, in the 1997 Survey of Education and Training in table 16, it can be seen that persons with either skilled or basic vocational qualifications have average weekly earnings that are higher by about 12% to 13%. Furthermore, in all Survey of Education and Training years, persons with sub-diploma VET qualifications have statistically significant higher probabilities of being employed.

An analysis of the effects of using either ABSCQ or ASCED scheme can also be made using tables 18 to 21. These are similar to the findings in the previous section, when a similar analysis was done using tables 8 to 11 with the alternative comparison group.

The results in tables 14 to 23 therefore suggest that, in terms of labour market outcomes, any person who has only less than 12 years of formal schooling could stand to benefit by enrolling in VET. However, as results in the previous section suggest, for persons who have completed high school, obtaining sub-diploma VET qualifications is of little or no benefit.

### Returns over time

Relative to non-school completers, the earnings premium of persons with at least a bachelor's degree remained consistently high over the period 1993 to 2005. For males (females), the premium was 54.8% (57.0%) in 1993, 53.1% (52.3%) in 1997, 56.5% (50.1%) in 2001 and 57.5% (54.7%) in 2005.

Similar to the results in tables 4 to 13 using Year 12 completers as the comparison group, we also find that for associate diploma holders, the credential re-labelling and change in grouping used resulted in higher premiums in 2001 and 2005, by comparison with 1993 and 1997. For example, in 1993, for males (females), the earnings premium for associate diploma holders over non-school completers was 24.6% (6.9%); in 2005, it was 33.0% (27.1%).

Recall that earlier in tables 8 to 11 using an alternative comparison group, we saw that the change from ABSCQ to ASCED played a much less important role in the returns from the sub-diploma VET qualifications. This is also the case using non-school completers as the comparison group (tables 18 to 21). Abstracting from this change in framework allows us to discuss more concretely the trends in the earnings premiums to holders of sub-diploma VET qualifications. For males, the earnings premium for skilled vocational qualifications or certificate III/IV qualifications during the period 1993 to 2005 ranged between 10% and 15%. For females, the earnings premium was over 12% in both 1993 and 2005, but not significantly different from zero in 1997 and 2001.

The returns from basic vocational qualifications or certificate I/II qualifications fluctuated a little over time but remained consistently positive relative to non-school completers. In 1993, for males (females) the premium was 15.3% (7.8%); in 1997, it was 13.4% (9.2%). It fell to 7.6% (4.2%) in

2001. In 2005, the earnings premium for males dropped further to 5.1%. However, it went back up to 9.6% for females.

**Table 14 Aggregate returns from education for the 1993 SET (ABSCQ) relative to less than Year 12, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.127*** (0.000)	0.008 (0.500)	0.066*** (0.000)	0.437*** (0.000)
Number of observations	1783	1740	1466	1203
Associate diploma	0.105*** (0.000)	0.019 (0.214)	0.057** (0.015)	0.220*** (0.000)
Number of observations	1087	1043	810	663
Skilled vocational qualifications	0.098*** (0.000)	0.021*** (0.007)	0.047*** (0.000)	0.093*** (0.000)
Number of observations	4294	4061	3029	2375
Basic vocational qualifications	0.079** (0.021)	-0.015 (0.591)	-0.012 (0.774)	0.142*** (0.002)
Number of observations	426	399	349	246

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 15 Aggregate returns from education for the 1993 SET (ABSCQ) relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.149*** (0.000)	0.078*** (0.001)	0.109*** (0.000)	0.451*** (0.000)
Number of observations	1589	1486	1423	856
Associate diploma	0.097*** (0.006)	0.090** (0.037)	0.031 (0.487)	0.067 (0.218)
Number of observations	494	429	397	222
Skilled vocational qualifications	0.115*** (0.000)	0.020 (0.550)	0.028 (0.444)	0.167*** (0.000)
Number of observations	843	721	613	277
Basic vocational qualifications	0.082*** (0.000)	-0.016 (0.539)	0.074*** (0.004)	0.075*** (0.007)
Number of observations	1567	1287	1261	547

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 16 Aggregate returns from education for the 1997 SET (ABSCQ) relative to less than Year 12, males**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Bachelor degree and above	0.105*** (0.000)	0.059*** (0.002)	0.130*** (0.000)	0.426*** (0.000)
Number of observations	2035	1976	1642	1424
Associate diploma	0.086*** (0.001)	0.116*** (0.001)	0.095*** (0.003)	0.256*** (0.000)
Number of observations	569	549	499	436
Skilled vocational qualifications	0.090*** (0.000)	-0.023 (0.114)	0.049*** (0.002)	0.118*** (0.000)
Number of observations	3491	3386	2478	2206
Basic vocational qualifications	0.032* (0.056)	0.003 (0.898)	0.015 (0.516)	0.126*** (0.000)
Number of observations	1557	1443	1175	1009

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 17 Aggregate returns from education for the 1997 SET (ABSCQ) relative to less than Year 12, females**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Bachelor degree and above	0.142*** (0.000)	0.120*** (0.000)	0.176*** (0.000)	0.421*** (0.000)
Number of observations	2028	1893	1814	1134
Associate diploma	0.103*** (0.002)	0.129*** (0.002)	0.129*** (0.002)	0.141*** (0.000)
Number of observations	539	485	488	299
Skilled vocational qualifications	0.111*** (0.002)	-0.036 (0.434)	0.063 (0.219)	0.028 (0.575)
Number of observations	479	411	349	166
Basic vocational qualifications	0.090*** (0.000)	0.037* (0.075)	0.074*** (0.000)	0.088*** (0.000)
Number of observations	2376	2022	1908	971

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 18 Aggregate returns from education for the 2001 SET (ABSCQ) relative to less than Year 12, males**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Bachelor degree and above	0.079*** (0.000)	0.037** (0.045)	0.134*** (0.000)	0.451*** (0.000)
Number of observations	2281	2242	1794	1596
Associate diploma	0.046** (0.048)	0.080** (0.020)	0.053 (0.110)	0.301*** (0.000)
Number of observations	666	632	521	474
Skilled vocational qualifications	0.072*** (0.000)	-0.044*** (0.003)	0.044*** (0.006)	0.139*** (0.000)
Number of observations	3536	3418	2410	2154
Basic vocational qualifications	0.023 (0.305)	-0.034 (0.270)	-0.022 (0.501)	0.084*** (0.007)
Number of observations	945	857	684	549

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 19 Aggregate returns from education for the 2001 SET (ABSCQ) relative to less than Year 12, females**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Bachelor degree and above	0.165*** (0.000)	0.098*** (0.000)	0.164*** (0.000)	0.413*** (0.000)
Number of observations	2433	2305	2187	1329
Associate diploma	0.197*** (0.000)	0.063 (0.127)	0.136*** (0.001)	0.197*** (0.000)
Number of observations	552	497	475	266
Skilled vocational qualifications	0.101*** (0.000)	-0.006 (0.868)	0.053 (0.145)	-0.011 (0.745)
Number of observations	826	705	641	344
Basic vocational qualifications	0.095*** (0.000)	0.028 (0.227)	0.102*** (0.000)	0.058** (0.020)
Number of observations	1930	1602	1448	712

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 20 Aggregate returns from education for the 2001 SET (ASCED) relative to less than Year 12, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.079*** (0.000)	0.040** (0.028)	0.143*** (0.000)	0.448*** (0.000)
Number of observations	2287	2248	1798	1599
Advanced diploma/diploma	0.033* (0.074)	0.088*** (0.002)	0.106*** (0.000)	0.350*** (0.000)
Number of observations	991	937	778	694
Certificate III/IV	0.066*** (0.000)	-0.050*** (0.000)	0.036** (0.017)	0.129*** (0.000)
Number of observations	3894	3759	2662	2374
Certificate I/II	0.017 (0.479)	-0.009 (0.793)	0.001 (0.986)	0.073** (0.032)
Number of observations	821	738	595	483

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 21 Aggregate returns from education for the 2001 SET (ASCED) relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.166*** (0.000)	0.094*** (0.000)	0.165*** (0.000)	0.406*** (0.000)
Number of observations	2516	2375	2251	1360
Advanced diploma/diploma	0.143*** (0.000)	0.048* (0.073)	0.170*** (0.000)	0.181*** (0.000)
Number of observations	1186	1082	980	498
Certificate III/IV	0.125*** (0.000)	-0.007 (0.796)	0.057** (0.047)	0.035 (0.179)
Number of observations	1234	1065	984	507
Certificate I/II	0.089*** (0.000)	0.043* (0.082)	0.106*** (0.000)	0.041 (0.131)
Number of observations	1668	1377	1226	616

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 22 Aggregate returns from education for the 2005 SET (ASCED) relative to less than Year 12, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.051*** (0.000)	0.046** (0.014)	0.101*** (0.000)	0.454*** (0.000)
Number of observations	2266	2218	1909	1581
Advanced diploma/diploma	0.053*** (0.001)	0.018 (0.531)	0.066** (0.019)	0.285*** (0.000)
Number of observations	1030	1002	842	652
Certificate III/IV	0.050*** (0.000)	-0.033** (0.027)	0.019 (0.220)	0.125*** (0.000)
Number of observations	3584	3479	2729	2268
Certificate I/II	-0.003 (0.870)	0.048 (0.125)	0.047 (0.173)	0.050 (0.144)
Number of observations	794	742	581	527

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 23 Aggregate returns from education for the 2005 SET (ASCED) relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.125*** (0.000)	0.143*** (0.000)	0.151*** (0.000)	0.436*** (0.000)
Number of observations	2684	2574	2324	1390
Advanced diploma/diploma	0.087*** (0.000)	0.103*** (0.000)	0.122*** (0.000)	0.240*** (0.000)
Number of observations	1200	1078	934	499
Certificate III/IV	0.123*** (0.000)	0.070*** (0.005)	0.105*** (0.000)	0.110*** (0.000)
Number of observations	1553	1406	1208	647
Certificate I/II	0.033 (0.107)	0.069** (0.014)	0.100*** (0.001)	0.092*** (0.008)
Number of observations	1327	1118	959	487

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Conditioning on school completion status

In this section, additional analysis that uses definitions of both the treatment and comparison groups which conditions on school completion status is performed.

Up to now, qualifications for the treatment group have been defined using the ‘highest level of qualification’ variable. Two comparison groups were used for the various treatment groups—Year 12 completers and persons with less than Year 12. These comparisons essentially reflect the returns for the highest level of educational qualifications, and not the total package of qualifications (or the route used to get there). For instance, it would be of interest if employers regard any VET qualification (with or without Year 12 qualifications) as being of more value than terminal Year 12 completions.

Ryan (2002b) notes that, since completion of Year 12 or of Year 10, in conjunction with a related certificate course, are common prerequisites for entry into associate diploma courses, school completers would be the obvious comparison group for associate diploma graduates. On the other hand, the outcomes of individuals with basic and skilled vocational qualifications are more appropriately compared with individuals who did not complete their schooling. This is because school completion is not a prerequisite for these qualifications and most of those in the Survey of Education and Training data with those qualifications would not have completed the highest level of school. For the estimates provided so far, emphasis should therefore focus on using the comparisons that are most relevant. For example, comparing persons with skilled vocational qualifications with persons who have completed Year 12 might lead to a downward bias on the effects of skilled vocational qualifications because there will be persons in the group with skilled vocational qualifications who have less than Year 12 qualifications (and who are likely to be of lower ability).

There is an important alternative to the approach used in Ryan (2002b) in choosing the most appropriate comparison groups for the various VET qualifications. At the moment, estimation of the average treatment effect does not account for the fact that there are individuals in the treatment group with VET qualifications who might or might not have completed Year 12. However, it would be possible to estimate the average treatment effect of VET for Year 12 completers and non-completers separately. In other words, when Year 12 completers are used as the comparison group, Year 12 completers are only compared with VET completers who have also completed Year 12. Similarly, when persons with less than Year 12 are used as the comparison group, persons with less than Year 12 are only compared with VET completers who have also less than Year 12.

Estimates of the returns from VET using this alternative way of defining the treatment group are provided in tables 24–39.<sup>7</sup> In general, for comparisons relative to Year 12 completers, removing non-completers from the treatment group increases the estimated size of the returns; for comparisons relative to persons with less than Year 12, removing Year 12 completers from the treatment group reduces the estimated size of the impact.

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<sup>7</sup> It was not possible to do this for the 1993 SET as only information on the highest level of post-school qualifications was available. It was not possible to determine if a person with post-school qualifications such as VET qualifications had completed Year 12.

## Conditioning on Year 12 completion in the treatment and comparison groups

**Table 24** Aggregate returns from education for the 1997 SET (ABSCQ), males, conditioning on school completion

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.044*** (0.000)	0.064*** (0.001)	0.076*** (0.000)	0.252*** (0.000)
Number of observations	1836	1782	1488	1293
Associate diploma	0.017 (0.554)	0.145*** (0.002)	0.056 (0.161)	0.086* (0.051)
Number of observations	302	290	270	242
Skilled vocational qualifications	0.033 (0.126)	0.002 (0.953)	0.045 (0.240)	0.043 (0.240)
Number of observations	515	503	395	359
Basic vocational qualifications	0.004 (0.889)	-0.014 (0.749)	0.011 (0.811)	-0.009 (0.859)
Number of observations	381	364	294	261

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 25** Aggregate returns from education for the 1997 SET (ABSCQ), females, conditioning on school completion

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.052*** (0.000)	0.069*** (0.002)	0.056*** (0.006)	0.272*** (0.000)
Number of observations	1791	1675	1607	1032
Associate diploma	0.005 (0.885)	0.026 (0.627)	-0.007 (0.896)	0.059 (0.183)
Number of observations	329	296	298	178
Skilled vocational qualifications	0.022 (0.775)	-0.020 (0.854)	0.109 (0.287)	-0.098 (0.230)
Number of observations	92	86	76	48
Basic vocational qualifications	-0.015 (0.576)	0.060 (0.113)	0.047 (0.205)	0.010 (0.696)
Number of observations	681	594	565	361

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 26 Aggregate returns from education for the 2001 SET (ABSCQ), males, conditioning on school completion**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.038*** (0.000)	-0.010 (0.595)	0.048*** (0.002)	0.263*** (0.000)
Number of observations	2033	2001	1597	1431
Associate diploma	0.008 (0.785)	0.009 (0.845)	0.004 (0.931)	0.132*** (0.003)
Number of observations	327	313	269	246
Skilled vocational qualifications	0.020 (0.290)	-0.014 (0.692)	0.039 (0.279)	0.022 (0.509)
Number of observations	574	566	452	410
Basic vocational qualifications	-0.020 (0.563)	0.027 (0.621)	0.020 (0.702)	-0.054 (0.299)
Number of observations	277	266	226	198

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 27 Aggregate returns from education for the 2001 SET (ABSCQ), females, conditioning on school completion**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.063*** (0.000)	0.038* (0.060)	0.073*** (0.000)	0.280*** (0.000)
Number of observations	2134	2021	1922	1189
Associate diploma	0.058 (0.131)	0.028 (0.593)	0.158*** (0.004)	0.028 (0.541)
Number of observations	303	280	266	161
Skilled vocational qualifications	-0.011 (0.808)	0.113* (0.058)	0.065 (0.283)	-0.080 (0.133)
Number of observations	251	220	210	156
Basic vocational qualifications	0.017 (0.593)	-0.050 (0.237)	0.021 (0.632)	-0.005 (0.897)
Number of observations	511	444	409	224

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 28 Aggregate returns from education for the 2001 SET (ASCED), males, conditioning on school completion**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.036*** (0.000)	-0.013 (0.502)	0.048*** (0.001)	0.268*** (0.000)
Number of observations	2037	2005	1607	1433
Advanced diploma/diploma	0.016 (0.416)	0.048 (0.194)	0.019 (0.558)	0.165*** (0.000)
Number of observations	595	575	484	420
Certificate III/IV	0.016 (0.348)	-0.016 (0.619)	0.037 (0.249)	0.039 (0.206)
Number of observations	693	678	547	497
Certificate I/II	-0.021 (0.603)	0.042 (0.482)	0.008 (0.895)	0.006 (0.918)
Number of observations	234	220	195	166

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 29 Aggregate returns from education for the 2001 SET (ASCED), females, conditioning on school completion**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.068*** (0.000)	0.047** (0.020)	0.066*** (0.001)	0.263*** (0.000)
Number of observations	2178	2059	1953	1205
Advanced diploma/diploma	0.043* (0.073)	0.013 (0.691)	0.091*** (0.007)	0.024 (0.443)
Number of observations	716	669	610	330
Certificate III/IV	0.026 (0.433)	0.062 (0.159)	0.090** (0.049)	-0.040 (0.298)
Number of observations	429	384	368	247
Certificate I/II	-0.001 (0.985)	-0.050 (0.313)	0.052 (0.286)	-0.051 (0.270)
Number of observations	407	340	314	182

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 30 Aggregate returns from education for the 2005 SET (ASCED), males, conditioning on school completion**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.039*** (0.000)	0.067*** (0.001)	0.062*** (0.000)	0.279*** (0.000)
Number of observations	2063	2025	1742	1440
Advanced diploma/diploma	0.052*** (0.001)	0.012 (0.738)	0.062* (0.065)	0.142*** (0.000)
Number of observations	634	623	547	421
Certificate III/IV	0.042*** (0.007)	0.021 (0.505)	0.039 (0.225)	0.050 (0.121)
Number of observations	831	816	676	573
Certificate I/II	0.007 (0.844)	0.065 (0.244)	0.036 (0.504)	0.015 (0.811)
Number of observations	275	265	224	186

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 31 Aggregate returns from education for the 2005 SET (ASCED), females, conditioning on school completion**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.048*** (0.000)	0.040** (0.029)	0.092*** (0.000)	0.320*** (0.000)
Number of observations	2450	2340	2118	1299
Advanced diploma/diploma	0.023 (0.292)	0.013 (0.684)	0.084** (0.011)	0.117*** (0.000)
Number of observations	790	728	632	358
Certificate III/IV	0.033 (0.190)	0.010 (0.796)	0.107*** (0.007)	-0.008 (0.807)
Number of observations	607	560	509	310
Certificate I/II	-0.031 (0.373)	0.052 (0.296)	0.099* (0.053)	0.035 (0.447)
Number of observations	410	347	314	184

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Conditioning on less than Year 12 in the treatment and comparison groups

**Table 32** Aggregate returns from education for the 1997 SET (ABSCQ), males, conditioning on less than Year 12

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.064 (0.125)	0.044 (0.516)	0.093 (0.120)	0.357*** (0.000)
Number of observations	199	190	154	130
Associate diploma	0.046 (0.219)	0.112** (0.030)	0.080 (0.115)	0.244*** (0.000)
Number of observations	268	259	230	197
Skilled vocational qualifications	0.084*** (0.000)	-0.027* (0.082)	0.040** (0.016)	0.107*** (0.000)
Number of observations	2976	2881	2082	1852
Basic vocational qualifications	0.022 (0.257)	-0.000 (0.995)	0.000 (0.992)	0.112*** (0.000)
Number of observations	1175	1079	878	747

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 33** Aggregate returns from education for the 1997 SET (ABSCQ), females, conditioning on less than Year 12

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.061 (0.218)	-0.036 (0.619)	0.087 (0.194)	0.374*** (0.000)
Number of observations	227	209	192	98
Associate diploma	0.067 (0.244)	0.216*** (0.002)	0.155** (0.020)	0.088 (0.159)
Number of observations	209	188	190	120
Skilled vocational qualifications	0.095** (0.017)	-0.053 (0.313)	0.025 (0.667)	0.043 (0.497)
Number of observations	387	325	273	118
Basic vocational qualifications	0.079*** (0.000)	0.011 (0.662)	0.035 (0.171)	0.059** (0.011)
Number of observations	1694	1422	1334	610

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 34 Aggregate returns from education for the 2001 SET (ABSCQ), males, conditioning on less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	-0.005 (0.859)	0.061 (0.128)	0.079** (0.023)	0.320*** (0.000)
Number of observations	535	498	393	340
Associate diploma	0.023 (0.488)	0.033 (0.506)	0.017 (0.720)	0.223*** (0.000)
Number of observations	342	322	256	230
Skilled vocational qualifications	0.057*** (0.000)	-0.054*** (0.001)	0.033* (0.066)	0.116*** (0.000)
Number of observations	2961	2852	1958	1746
Basic vocational qualifications	-0.005 (0.848)	-0.065* (0.079)	-0.050 (0.218)	0.067* (0.083)
Number of observations	671	593	462	353

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 35 Aggregate returns from education for the 2001 SET (ABSCQ), females, conditioning on less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.071** (0.011)	0.029 (0.448)	0.143*** (0.000)	0.258*** (0.000)
Number of observations	697	618	564	272
Associate diploma	0.148*** (0.002)	0.051 (0.427)	0.094 (0.150)	0.177*** (0.002)
Number of observations	242	215	210	100
Skilled vocational qualifications	0.080** (0.015)	-0.045 (0.271)	-0.030 (0.496)	-0.058 (0.213)
Number of observations	574	485	430	188
Basic vocational qualifications	0.073*** (0.001)	0.036 (0.187)	0.078*** (0.007)	0.056* (0.077)
Number of observations	1409	1162	1041	484

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 36 Aggregate returns from education for the 2001 SET (ASCED), males, conditioning on less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.006 (0.862)	0.040 (0.500)	0.104** (0.030)	0.333*** (0.000)
Number of observations	251	241	196	162
Advanced diploma/diploma	-0.010 (0.745)	0.118** (0.011)	0.102** (0.014)	0.322*** (0.000)
Number of observations	397	364	298	272
Certificate III/IV	0.058*** (0.000)	-0.057*** (0.000)	0.024 (0.160)	0.114*** (0.000)
Number of observations	3203	3077	2113	1876
Certificate I/II	-0.003 (0.905)	-0.046 (0.252)	-0.031 (0.472)	0.045 (0.313)
Number of observations	591	522	404	317

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 37 Aggregate returns from education for the 2001 SET (ASCED), females, conditioning on less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.098** (0.020)	0.027 (0.648)	0.184*** (0.001)	0.406*** (0.000)
Number of observations	321	295	267	140
Advanced diploma/diploma	0.089** (0.011)	0.066 (0.142)	0.129*** (0.006)	0.172*** (0.001)
Number of observations	465	407	370	171
Certificate III/IV	0.083*** (0.002)	-0.038 (0.268)	0.006 (0.880)	0.003 (0.943)
Number of observations	803	681	620	260
Certificate I/II	0.076*** (0.001)	0.037 (0.198)	0.052* (0.088)	0.049 (0.154)
Number of observations	1254	1030	922	434

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 38 Aggregate returns from education for the 2005 SET (ASCED), males, conditioning on less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	-0.007 (0.862)	0.053 (0.429)	0.087 (0.147)	0.364*** (0.000)
Number of observations	199	192	163	138
Advanced diploma/diploma	0.019 (0.503)	0.011 (0.827)	0.043 (0.365)	0.298*** (0.000)
Number of observations	395	374	293	232
Certificate III/IV	0.036*** (0.000)	-0.032* (0.063)	0.001 (0.977)	0.113*** (0.000)
Number of observations	2751	2660	2039	1691
Certificate I/II	-0.010 (0.696)	0.066* (0.096)	0.011 (0.792)	0.038 (0.389)
Number of observations	510	469	357	330

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 39 Aggregate returns from education for the 2005 SET (ASCED), females, conditioning on less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Bachelor degree and above	0.030 (0.449)	0.094 (0.153)	0.107* (0.077)	0.415*** (0.000)
Number of observations	256	238	219	118
Advanced diploma/diploma	0.026 (0.448)	0.055 (0.290)	0.100* (0.054)	0.171*** (0.004)
Number of observations	403	356	299	152
Certificate III/IV	0.084*** (0.000)	0.047 (0.143)	0.104*** (0.003)	0.102** (0.010)
Number of observations	952	849	699	349
Certificate I/II	0.030 (0.214)	0.036 (0.295)	0.068* (0.063)	0.066 (0.120)
Number of observations	918	769	646	303

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Returns by field of education, Year 12 as comparison group

In this section, as discussed in the methodology section, each VET-related educational qualification is broadly grouped into one of three groups: business; engineering, architecture and building; and other. Examining returns for these smaller subgroups by field of education is useful in helping to provide a sense of the heterogeneity of returns associated with different levels of qualifications.

The results in tables 40 to 49 suggest that relative to having a Year 12 qualification, only advanced diploma/diploma qualifications result in positive labour market outcomes. In 2001, males with business advanced diplomas/diplomas had the relatively largest impacts, with an expected earnings premium of 18.8%. The corresponding premium for females in 2001 was 9.9%. In 2005, although the premium for males dropped slightly to 15.3%, females with business advanced diplomas/diplomas saw a growth in their premium to 17.4%.

Note that these results are consistent with the aggregate results in tables 10, 12 and 13, where it was suggested that there were positive benefits associated with obtaining advanced diplomas/diplomas, relative to a Year 12 completion. Here, it is further suggested that among the courses available for diplomas, business studies is the field of education that appears to provide the highest return.

**Table 40 Returns from education for the 1993 SET (ABSCQ) by field of study relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Associate diploma – business	0.028 (0.503)	0.029 (0.508)	-0.028 (0.615)	0.152** (0.043)
Number of observations	164	156	122	106
Associate diploma – engineering	0.039* (0.082)	0.034 (0.105)	0.021 (0.513)	0.050 (0.215)
Number of observations	550	532	402	320
Associate diploma – other	0.014 (0.641)	-0.008 (0.756)	0.055 (0.118)	0.061 (0.227)
Number of observations	373	356	287	237
Skilled vocational qualifications – business	-0.022 (0.556)	0.037 (0.252)	0.073 (0.124)	0.095 (0.165)
Number of observations	224	210	170	140
Skilled vocational qualifications – engineering	-0.006 (0.578)	0.020** (0.029)	-0.003 (0.868)	-0.027 (0.105)
Number of observations	3082	2923	2149	1692
Skilled vocational qualifications – other	0.006 (0.748)	0.008 (0.640)	0.022 (0.396)	-0.046 (0.138)
Number of observations	988	927	709	546
Basic vocational qualifications – business	-0.010 (0.862)	0.045 (0.403)	0.060 (0.396)	0.177* (0.097)
Number of observations	114	111	98	76
Basic vocational qualifications – engineering	-0.102 (0.258)	0.095 (0.192)	-0.149 (0.164)	-0.103 (0.417)
Number of observations	72	62	66	44
Basic vocational qualifications – other	0.002 (0.963)	-0.034 (0.437)	-0.021 (0.715)	0.035 (0.586)
Number of observations	240	226	186	126

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 41 Returns from education for the 1993 SET (ABSCQ) by field of study relative to Year 12 completers, females**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Associate diploma – business	0.073 (0.275)	0.080 (0.326)	-0.107 (0.211)	-0.104 (0.314)
Number of observations	132	115	112	66
Associate diploma – engineering	0.102	0.341	0.235	-0.251
Number of observations	11	9	8	6
Associate diploma – other	0.076* (0.062)	0.025 (0.629)	-0.001 (0.978)	-0.020 (0.758)
Number of observations	350	304	277	146
Skilled vocational qualifications – business	0.089 (0.104)	0.049 (0.513)	0.099 (0.173)	0.061 (0.357)
Number of observations	193	172	147	89
Skilled vocational qualifications – engineering	0.122 (0.607)	0.056 (0.803)	0.052 (0.847)	0.167 (0.624)
Number of observations	26	24	24	16
Skilled vocational qualifications – other	0.058* (0.070)	-0.038 (0.351)	-0.021 (0.621)	0.053 (0.215)
Number of observations	624	527	444	172
Basic vocational qualifications – business	0.014 (0.587)	-0.035 (0.284)	0.006 (0.863)	0.007 (0.807)
Number of observations	936	763	746	344
Basic vocational qualifications – engineering	0.049	-0.425	-0.496	-0.455
Number of observations	9	8	9	4
Basic vocational qualifications – other	0.059* (0.065)	-0.060 (0.144)	0.045 (0.246)	-0.066 (0.144)
Number of observations	625	522	507	202

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 42 Returns from education for the 1997 SET (ABSCQ) by field of study relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Associate diploma – business	0.026 (0.567)	0.095 (0.169)	0.081 (0.159)	0.067 (0.344)
Number of observations	149	144	128	112
Associate diploma – engineering	0.038 (0.211)	0.141*** (0.006)	0.068 (0.143)	0.095* (0.053)
Number of observations	250	248	212	196
Associate diploma – other	0.003 (0.946)	0.127** (0.046)	-0.005 (0.936)	0.039 (0.550)
Number of observations	169	158	152	128
Skilled vocational qualifications – business	0.076 (0.272)	-0.042 (0.732)	0.073 (0.709)	0.040 (0.795)
Number of observations	64	62	34	32
Skilled vocational qualifications – engineering	0.014 (0.130)	-0.002 (0.887)	0.015 (0.368)	-0.071*** (0.000)
Number of observations	3072	2986	2123	1905
Skilled vocational qualifications – other	0.005 (0.858)	0.058 (0.208)	0.048 (0.307)	-0.081* (0.087)
Number of observations	355	338	288	248
Basic vocational qualifications – business	-0.004 (0.918)	0.104** (0.042)	0.071 (0.179)	0.065 (0.293)
Number of observations	278	260	218	196
Basic vocational qualifications – engineering	-0.045* (0.050)	-0.003 (0.926)	0.006 (0.882)	-0.055 (0.176)
Number of observations	591	560	422	369
Basic vocational qualifications – other	-0.047* (0.055)	-0.005 (0.885)	-0.067* (0.064)	-0.077** (0.049)
Number of observations	687	624	520	428

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 43 Returns from education for the 1997 SET (ABSCQ) by field of study relative to Year 12 completers, females**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Associate diploma – business	0.011 (0.798)	0.166*** (0.006)	0.032 (0.566)	-0.033 (0.462)
Number of observations	235	213	220	156
Associate diploma – engineering	-0.342 (0.167)	0.280 (0.442)	0.192 (0.466)	0.233 .
Number of observations	28	23	26	15
Associate diploma – other	-0.014 (0.750)	-0.004 (0.945)	-0.073 (0.216)	0.050 (0.362)
Number of observations	271	243	239	118
Skilled vocational qualifications – business	0.100 (0.446)	0.174 (0.357)	0.093 (0.643)	0.005 (0.981)
Number of observations	46	43	38	24
Skilled vocational qualifications – engineering	-0.027 (0.831)	-0.028 (0.882)	-0.007 (0.972)	-0.305 (0.321)
Number of observations	54	45	39	21
Skilled vocational qualifications – other	-0.044 (0.224)	-0.149*** (0.004)	-0.092 (0.102)	-0.127** (0.012)
Number of observations	380	319	269	118
Basic vocational qualifications – business	-0.029 (0.109)	0.040 (0.107)	-0.003 (0.892)	-0.037** (0.043)
Number of observations	1535	1320	1254	693
Basic vocational qualifications – engineering	-0.007 (0.940)	-0.054 (0.722)	-0.039 (0.800)	-0.086 (0.699)
Number of observations	68	58	52	22
Basic vocational qualifications – other	-0.067** (0.011)	-0.087** (0.018)	-0.142*** (0.000)	-0.093*** (0.002)
Number of observations	772	640	586	254

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 44 Returns from education for the 2001 SET (ABSCQ) by field of study relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Associate diploma – business	0.035 (0.376)	0.026 (0.707)	0.038 (0.539)	0.054 (0.436)
Number of observations	180	174	144	132
Associate diploma – engineering	-0.017 (0.612)	-0.008 (0.883)	0.000 (0.994)	0.126** (0.017)
Number of observations	270	261	200	190
Associate diploma – other	-0.035 (0.374)	0.045 (0.478)	-0.057 (0.337)	0.032 (0.610)
Number of observations	216	197	181	152
Skilled vocational qualifications – business	-0.019 (0.818)	-0.223 (0.120)	-0.046 (0.855)	-0.048 (0.863)
Number of observations	62	58	29	25
Skilled vocational qualifications – engineering	0.003 (0.692)	-0.085*** (0.000)	-0.026 (0.114)	-0.064*** (0.000)
Number of observations	2945	2865	1985	1804
Skilled vocational qualifications – other	-0.009 (0.692)	-0.061 (0.134)	-0.033 (0.411)	-0.163*** (0.000)
Number of observations	505	480	377	315
Basic vocational qualifications – business	-0.027 (0.483)	0.035 (0.589)	-0.011 (0.855)	-0.083 (0.200)
Number of observations	216	199	165	144
Basic vocational qualifications – engineering	-0.077* (0.054)	-0.086 (0.135)	-0.022 (0.738)	-0.016 (0.779)
Number of observations	274	245	186	156
Basic vocational qualifications – other	-0.063** (0.032)	-0.081* (0.075)	-0.103** (0.029)	-0.110** (0.020)
Number of observations	457	401	320	248

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 45 Returns from education for the 2001 SET (ABSCQ) by field of study relative to Year 12 completers, females**

	Employment	Full-time/part-time employment	Permanent/casual employment	Log weekly earnings
Associate diploma – business	0.064 (0.136)	0.131** (0.020)	0.117** (0.047)	0.050 (0.241)
Number of observations	262	235	228	142
Associate diploma – engineering	0.151 (0.383)	0.087 (0.786)	0.093 (0.738)	-0.072 (0.891)
Number of observations	29	27	26	15
Associate diploma – other	0.061 (0.140)	-0.122** (0.040)	-0.017 (0.787)	0.024 (0.701)
Number of observations	258	236	218	103
Skilled vocational qualifications – business	-0.007 (0.892)	0.139** (0.045)	0.024 (0.739)	-0.111* (0.069)
Number of observations	184	162	160	115
Skilled vocational qualifications – engineering	-0.018 (0.838)	0.027 (0.841)	-0.048 (0.785)	-0.068 (0.646)
Number of observations	68	58	44	27
Skilled vocational qualifications – other	-0.040 (0.180)	-0.124*** (0.002)	-0.109** (0.011)	-0.183*** (0.000)
Number of observations	571	483	431	196
Basic vocational qualifications – business	-0.021 (0.323)	0.046 (0.104)	0.018 (0.547)	-0.092*** (0.004)
Number of observations	1176	1000	856	473
Basic vocational qualifications – engineering	-0.154 (0.482)	-0.018 (0.968)	-0.366 (0.552)	-0.336 .
Number of observations	33	24	23	6
Basic vocational qualifications – other	-0.034 (0.210)	-0.078** (0.041)	-0.080** (0.044)	-0.048 (0.219)
Number of observations	703	569	527	232

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 46 Returns from education for the 2001 SET (ASCED) by field of education relative to Year 12 completers, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Advanced diploma/diploma – business	0.002 (0.958)	0.037 (0.511)	0.039 (0.388)	0.172*** (0.001)
Number of observations	289	271	220	202
Advanced diploma/diploma – engineering	0.008 (0.769)	0.080 (0.107)	0.023 (0.568)	0.138*** (0.002)
Number of observations	326	313	256	238
Advanced diploma/diploma – other	-0.027 (0.343)	0.050 (0.299)	-0.002 (0.965)	0.086* (0.060)
Number of observations	368	344	293	246
Certificate III/IV qualifications – business	-0.014 (0.753)	-0.069 (0.382)	-0.028 (0.688)	-0.059 (0.467)
Number of observations	160	146	100	90
Certificate III/IV qualifications – engineering	0.005 (0.557)	-0.082*** (0.000)	-0.037** (0.019)	-0.063*** (0.000)
Number of observations	3131	3049	2097	1910
Certificate III/IV qualifications – other	-0.019 (0.373)	-0.044 (0.236)	-0.064* (0.088)	-0.150*** (0.000)
Number of observations	571	539	441	364
Certificate I/II qualifications – business	-0.126 (0.518)	-0.145 (0.702)	-0.029 .	-0.369 .
Number of observations	27	24	14	8
Certificate I/II qualifications – engineering	-0.155 (0.170)	-0.406*** (0.010)	-0.505** (0.013)	-0.130 (0.803)
Number of observations	66	50	45	22
Certificate I/II qualifications – other	-0.053** (0.020)	-0.020 (0.562)	-0.025 (0.479)	-0.113*** (0.001)
Number of observations	730	665	535	442

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 47 Returns from education for the 2001 SET (ASCED) by field of education relative to Year 12 completers, females**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Advanced diploma/diploma – business	0.065* (0.073)	0.118** (0.027)	0.125*** (0.008)	0.094** (0.043)
Number of observations	310	292	276	182
Advanced diploma/diploma – engineering	0.026 (0.830)	0.068 (0.742)	0.102 (0.668)	0.105 (0.836)
Number of observations	40	38	31	22
Advanced diploma/diploma – other	0.002 (0.920)	-0.049 (0.129)	0.045 (0.191)	-0.027 (0.468)
Number of observations	814	733	641	285
Certificate III/IV qualifications – business	-0.014 (0.703)	0.135*** (0.006)	0.082 (0.113)	-0.020 (0.632)
Number of observations	339	294	290	198
Certificate III/IV qualifications – engineering	-0.007 (0.922)	0.087 (0.449)	0.033 (0.793)	-0.073 (0.531)
Number of observations	90	78	62	42
Certificate III/IV qualifications – other	-0.014 (0.552)	-0.123*** (0.000)	-0.109*** (0.002)	-0.144*** (0.000)
Number of observations	800	675	607	263
Certificate I/II qualifications – business	-0.077 (0.270)	-0.025 (0.804)	-0.192** (0.046)	-0.032 (0.757)
Number of observations	124	100	88	46
Certificate I/II qualifications – engineering	-0.000 .	-0.114 .	-0.356 .	0.129 .
Number of observations	16	10	10	2
Certificate I/II qualifications – other	-0.029 (0.118)	-0.010 (0.709)	-0.026 (0.342)	-0.090*** (0.002)
Number of observations	1522	1254	1115	559

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 48 Returns from education for the 2005 SET (ASCED) by field of education relative to Year 12 completers, males**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Advanced diploma/diploma – business	0.043 (0.125)	0.080 (0.131)	0.027 (0.598)	0.142*** (0.008)
Number of observations	322	312	267	217
Advanced diploma/diploma – engineering	0.043 (0.166)	0.008 (0.877)	0.011 (0.815)	0.064 (0.265)
Number of observations	272	270	244	181
Advanced diploma/diploma – other	0.037 (0.102)	-0.062 (0.173)	0.015 (0.722)	0.065 (0.199)
Number of observations	427	413	323	253
Certificate III/IV qualifications – business	0.067** (0.028)	0.070 (0.230)	0.084 (0.125)	0.030 (0.656)
Number of observations	245	243	202	174
Certificate III/IV qualifications – engineering	0.042*** (0.000)	-0.018 (0.294)	0.000 (0.979)	-0.029 (0.128)
Number of observations	2713	2638	2030	1633
Certificate III/IV qualifications – other	0.010 (0.656)	0.046 (0.210)	-0.013 (0.725)	-0.112*** (0.004)
Number of observations	625	600	494	426
Certificate I/II qualifications – business	0.061 (0.152)	0.121* (0.073)	0.086 (0.146)	0.007 (0.925)
Number of observations	199	192	158	138
Certificate I/II qualifications – engineering	0.012 (0.717)	0.064 (0.224)	0.054 (0.321)	-0.121** (0.045)
Number of observations	309	297	222	212
Certificate I/II qualifications – other	-0.095** (0.014)	0.025 (0.670)	-0.078 (0.202)	-0.039 (0.522)
Number of observations	275	249	201	175

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 49 Returns from education for the 2005 SET (ASCED) by field of education relative to Year 12 completers, females**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Advanced diploma/diploma – business	0.050 (0.182)	0.092* (0.076)	0.160*** (0.002)	0.160*** (0.002)
Number of observations	313	285	253	171
Advanced diploma/diploma – engineering	0.011 (0.979)	0.382 (0.593)	-0.036 (0.942)	0.194 .
Number of observations	25	26	26	17
Advanced diploma/diploma – other	0.010 (0.644)	-0.018 (0.587)	0.064* (0.053)	0.128*** (0.001)
Number of observations	857	764	652	316
Certificate III/IV qualifications – business	0.051* (0.059)	0.161*** (0.000)	0.173*** (0.000)	0.019 (0.527)
Number of observations	551	511	461	330
Certificate III/IV qualifications – engineering	0.061 (0.370)	-0.020 (0.849)	-0.010 (0.935)	-0.053 (0.763)
Number of observations	94	90	80	34
Certificate III/IV qualifications – other	0.004 (0.869)	-0.096*** (0.003)	-0.016 (0.659)	-0.087** (0.018)
Number of observations	910	804	667	294
Certificate I/II qualifications – business	-0.022 (0.315)	0.005 (0.878)	0.061* (0.067)	0.023 (0.504)
Number of observations	933	806	698	355
Certificate I/II qualifications – engineering	0.007 (0.966)	-0.234 (0.517)	-0.040 (0.925)	-0.707 .
Number of observations	31	25	22	5
Certificate I/II qualifications – other	-0.085** (0.026)	-0.063 (0.269)	-0.001 (0.988)	-0.084 (0.158)
Number of observations	354	280	236	119

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Returns by field of education, less than Year 12 as comparison group

We repeat the empirical exercise conducted in the previous section, but this time using persons with less than 12 years of schooling as the comparison group. Recall that earlier we found that obtaining any kind of VET qualification (even basic vocational qualifications [ABSCQ] or certificate I/II [ASCED]) led to relatively better labour market outcomes by comparison with those who had less than Year 12. The results in tables 50 to 59 aim to provide more information regarding the returns associated with different fields of study at each level of qualification.

In 1993, business studies dominated all fields in terms of providing the largest earnings impacts, regardless of whether the VET qualification in question was an associate diploma, skilled or basic vocational qualification (tables 50 and 51). However, in 1997, engineering, architecture, building and automotive studies led to the highest returns on earnings for males with associate diplomas (table 52). Returns for both these fields of study similarly dominated the 'other' field of education category in 2001 and 2005.

Overall, it therefore appears that, for persons with less than a Year 12 qualification, positive returns can be expected from undertaking business studies or specific trade studies (engineering, architecture, building and automotive). In the most recent year when Survey of Education and Training data are available (2005), for qualifications below the diploma level, there were no positive labour market returns from obtaining qualifications in the non-trade fields of study (for example, agriculture, creative arts, education, health, hospitality, society and culture etc.) for males. However, for females, it appears that certificate I/II business qualifications led to an earnings premium of 13.0%; the associated impact of full-time/part-time employment was also a positive 12.1%.

**Table 50 Returns from education for the 1993 SET (ABSCQ) by field of study relative to less than Year 12, males**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Associate diploma – business	0.116** (0.025)	0.020 (0.649)	0.047 (0.478)	0.297*** (0.000)
Number of observations	163	155	121	106
Associate diploma – engineering	0.103*** (0.000)	0.024 (0.224)	0.041 (0.226)	0.210*** (0.000)
Number of observations	552	533	401	319
Associate diploma – other	0.112*** (0.001)	-0.002 (0.936)	0.088** (0.021)	0.202*** (0.000)
Number of observations	374	355	287	237
Skilled vocational qualifications – business	0.071* (0.099)	0.029 (0.370)	0.063 (0.202)	0.181*** (0.008)
Number of observations	224	209	169	140
Skilled vocational qualifications – engineering	0.098*** (0.000)	0.020** (0.028)	0.045*** (0.004)	0.082*** (0.000)
Number of observations	3081	2924	2150	1691
Skilled vocational qualifications – other	0.098*** (0.000)	0.013 (0.445)	0.045* (0.092)	0.084*** (0.009)
Number of observations	987	928	710	548
Basic vocational qualifications – business	0.095 (0.163)	0.016 (0.747)	0.045 (0.550)	0.223** (0.028)
Number of observations	113	111	98	76
Basic vocational qualifications – engineering	-0.045 (0.662)	0.087 (0.195)	-0.097 (0.397)	0.035 (0.797)
Number of observations	72	62	66	44
Basic vocational qualifications – other	0.099** (0.031)	-0.053 (0.205)	-0.025 (0.667)	0.145** (0.034)
Number of observations	240	225	185	126

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 51 Returns from education for the 1993 SET (ABSCQ) by field of study relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Associate diploma – business	0.085 (0.227)	0.103 (0.208)	-0.031 (0.732)	0.096 (0.375)
Number of observations	131	116	112	70
Associate diploma – engineering	0.070	0.321	0.250	0.142
Number of observations	11	10	7	5
Associate diploma – other	0.105** (0.012)	0.067 (0.204)	0.045 (0.396)	0.054 (0.406)
Number of observations	350	304	278	146
Skilled vocational qualifications – business	0.132** (0.018)	0.068 (0.352)	0.097 (0.190)	0.223*** (0.004)
Number of observations	193	172	148	90
Skilled vocational qualifications – engineering	0.151 (0.550)	0.194 (0.471)	0.070 (0.808)	0.258
Number of observations	26	24	22	15
Skilled vocational qualifications – other	0.112*** (0.001)	0.001 (0.975)	0.006 (0.899)	0.133*** (0.004)
Number of observations	624	525	441	172
Basic vocational qualifications – business	0.075*** (0.005)	0.003 (0.922)	0.071** (0.034)	0.094*** (0.006)
Number of observations	934	762	743	341
Basic vocational qualifications – engineering	0.080	-0.045	-0.444	-0.085
Number of observations	9	7	10	4
Basic vocational qualifications – other	0.098*** (0.002)	-0.040 (0.338)	0.087** (0.030)	0.046 (0.338)
Number of observations	628	521	505	204

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 52 Returns from education for the 1997 SET (ABSCQ) by field of study relative to less than Year 12, males**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Associate diploma – business	0.081 (0.115)	0.136* (0.052)	0.122* (0.062)	0.248*** (0.000)
Number of observations	150	144	130	112
Associate diploma – engineering	0.114*** (0.002)	0.127** (0.013)	0.109** (0.025)	0.300*** (0.000)
Number of observations	250	247	216	197
Associate diploma – other	0.060 (0.251)	0.083 (0.197)	0.067 (0.305)	0.219*** (0.000)
Number of observations	170	158	152	128
Skilled vocational qualifications – business	0.123 (0.137)	-0.036 (0.790)	0.111 (0.589)	0.209 (0.219)
Number of observations	64	62	34	32
Skilled vocational qualifications – engineering	0.089*** (0.000)	-0.028* (0.064)	0.042** (0.011)	0.125*** (0.000)
Number of observations	3072	2985	2155	1932
Skilled vocational qualifications – other	0.092*** (0.010)	0.041 (0.356)	0.079* (0.092)	0.072 (0.102)
Number of observations	356	337	288	248
Basic vocational qualifications – business	0.039 (0.337)	0.117** (0.029)	0.055 (0.307)	0.216*** (0.000)
Number of observations	278	259	215	194
Basic vocational qualifications – engineering	0.035 (0.197)	-0.019 (0.606)	0.038 (0.310)	0.119*** (0.002)
Number of observations	591	559	441	386
Basic vocational qualifications – other	0.027 (0.309)	-0.029 (0.395)	-0.026 (0.481)	0.077** (0.042)
Number of observations	687	623	519	428

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 53 Returns from education for the 1997 SET (ABSCQ) by field of study relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Associate diploma – business	0.140*** (0.006)	0.205*** (0.001)	0.168*** (0.005)	0.109** (0.038)
Number of observations	239	218	219	158
Associate diploma – engineering	-0.104 (0.707)	0.270 (0.435)	0.308 (0.249)	0.325 .
Number of observations	27	24	26	15
Associate diploma – other	0.095* (0.051)	0.062 (0.320)	0.065 (0.294)	0.152** (0.021)
Number of observations	271	243	242	122
Skilled vocational qualifications – business	0.178 (0.173)	0.226 (0.234)	0.179 (0.402)	0.115 (0.576)
Number of observations	46	43	40	26
Skilled vocational qualifications – engineering	0.123 (0.361)	0.017 (0.927)	0.133 (0.529)	0.018 (0.951)
Number of observations	54	48	40	21
Skilled vocational qualifications – other	0.102** (0.011)	-0.075 (0.147)	0.049 (0.404)	0.015 (0.794)
Number of observations	379	320	269	118
Basic vocational qualifications – business	0.093*** (0.000)	0.077*** (0.002)	0.100*** (0.000)	0.100*** (0.000)
Number of observations	1536	1322	1269	695
Basic vocational qualifications – engineering	0.126 (0.259)	-0.040 (0.800)	0.059 (0.707)	0.025 (0.915)
Number of observations	68	58	52	22
Basic vocational qualifications – other	0.077*** (0.008)	-0.032 (0.394)	0.011 (0.769)	0.041 (0.258)
Number of observations	771	638	585	253

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 54 Returns from education for the 2001 (ABSCQ) SET by field of study relative to less than Year 12, males**

	<b>Employment</b>	<b>Full-time/ part-time employment</b>	<b>Permanent/ casual employment</b>	<b>Log weekly earnings</b>
Associate diploma – business	0.076*	0.119*	0.090	0.298***
	(0.093)	(0.086)	(0.210)	(0.000)
Number of observations	182	174	144	132
Associate diploma – engineering	0.028	0.037	0.075	0.330***
	(0.456)	(0.496)	(0.135)	(0.000)
Number of observations	272	261	200	189
Associate diploma – other	0.039	0.073	0.002	0.241***
	(0.390)	(0.251)	(0.980)	(0.000)
Number of observations	216	200	182	154
Skilled vocational qualifications – business	0.043	-0.218*	-0.002	-0.087
	(0.645)	(0.099)	(0.993)	(0.808)
Number of observations	64	59	30	25
Skilled vocational qualifications – engineering	0.069***	-0.044***	0.046***	0.150***
	(0.000)	(0.007)	(0.009)	(0.000)
Number of observations	2965	2880	2002	1811
Skilled vocational qualifications – other	0.061**	-0.024	0.052	0.006
	(0.027)	(0.567)	(0.234)	(0.881)
Number of observations	507	481	377	316
Basic vocational qualifications – business	0.049	0.068	0.043	0.126*
	(0.270)	(0.293)	(0.501)	(0.065)
Number of observations	219	206	168	146
Basic vocational qualifications – engineering	0.024	-0.043	-0.014	0.146**
	(0.608)	(0.447)	(0.838)	(0.011)
Number of observations	274	245	190	156
Basic vocational qualifications – other	0.016	-0.062	-0.046	0.037
	(0.638)	(0.173)	(0.337)	(0.421)
Number of observations	454	407	330	252

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 55 Returns from education for the 2001 (ABSCQ) SET by field of study relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Associate diploma – business	0.219*** (0.000)	0.142** (0.018)	0.171*** (0.004)	0.198*** (0.000)
Number of observations	260	235	227	143
Associate diploma – engineering	0.330 (0.170)	0.112 (0.714)	0.092 (0.794)	0.182 (0.700)
Number of observations	30	28	26	15
Associate diploma – other	0.158*** (0.001)	-0.050 (0.411)	0.053 (0.413)	0.105* (0.066)
Number of observations	258	235	215	104
Skilled vocational qualifications – business	0.154** (0.010)	0.167** (0.018)	0.159** (0.031)	0.054 (0.313)
Number of observations	186	161	162	116
Skilled vocational qualifications – engineering	0.106 (0.326)	-0.005 (0.970)	0.032 (0.864)	0.034 (0.845)
Number of observations	68	60	45	27
Skilled vocational qualifications – other	0.081** (0.014)	-0.060 (0.146)	-0.010 (0.826)	-0.083* (0.080)
Number of observations	571	483	434	196
Basic vocational qualifications – business	0.092*** (0.000)	0.081*** (0.005)	0.124*** (0.000)	0.054* (0.100)
Number of observations	1187	1008	890	478
Basic vocational qualifications – engineering	-0.126 (0.510)	-0.066 (0.847)	-0.152 (0.691)	0.162 .
Number of observations	39	26	25	7
Basic vocational qualifications – other	0.123*** (0.000)	-0.051 (0.180)	0.074* (0.065)	0.072* (0.073)
Number of observations	704	580	542	224

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 56 Returns from education for the 2001 (ASCED) SET by field of education relative to less than Year 12, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Advanced diploma/diploma – business	0.021 (0.555)	0.144*** (0.010)	0.131** (0.012)	0.405*** (0.000)
Number of observations	289	271	220	202
Advanced diploma/diploma – engineering	0.056* (0.083)	0.128** (0.011)	0.120*** (0.007)	0.359*** (0.000)
Number of observations	327	315	262	240
Advanced diploma/diploma – other	0.020 (0.535)	0.045 (0.343)	0.063 (0.168)	0.270*** (0.000)
Number of observations	365	344	292	244
Certificate III/IV qualifications – business	0.040 (0.406)	-0.046 (0.547)	0.070 (0.412)	0.154* (0.069)
Number of observations	161	150	100	90
Certificate III/IV qualifications – engineering	0.073*** (0.000)	-0.051*** (0.001)	0.038** (0.026)	0.145*** (0.000)
Number of observations	3158	3066	2118	1915
Certificate III/IV qualifications – other	0.051** (0.049)	-0.003 (0.930)	0.032 (0.435)	0.009 (0.803)
Number of observations	571	539	441	364
Certificate I/II qualifications – business	0.047 (0.823)	-0.053 (0.878)	0.252 .	-0.099 .
Number of observations	27	24	15	11
Certificate I/II qualifications – engineering	-0.100 (0.430)	-0.282* (0.090)	-0.376** (0.030)	0.279 (0.445)
Number of observations	65	50	46	22
Certificate I/II qualifications – other	0.024 (0.342)	-0.003 (0.940)	0.009 (0.797)	0.071** (0.042)
Number of observations	725	662	535	447

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 57 Returns from education for the 2001 (ASCED) SET by field of education relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Advanced diploma/diploma – business	0.203*** (0.000)	0.182*** (0.001)	0.271*** (0.000)	0.219*** (0.000)
Number of observations	309	291	276	182
Advanced diploma/diploma – engineering	0.129 (0.483)	0.104 (0.642)	0.283 (0.294)	0.081 .
Number of observations	42	38	32	21
Advanced diploma/diploma – other	0.123*** (0.000)	-0.003 (0.928)	0.113*** (0.001)	0.164*** (0.000)
Number of observations	821	739	662	295
Certificate III/IV qualifications – business	0.176*** (0.000)	0.163*** (0.002)	0.166*** (0.001)	0.044 (0.304)
Number of observations	342	293	294	198
Certificate III/IV qualifications – engineering	0.154 (0.102)	0.079 (0.499)	0.032 (0.822)	0.003 (0.980)
Number of observations	90	80	66	42
Certificate III/IV qualifications – other	0.096*** (0.000)	-0.087** (0.010)	0.031 (0.389)	-0.011 (0.772)
Number of observations	800	689	628	263
Certificate I/II qualifications – business	0.021 (0.780)	0.137 (0.192)	-0.022 (0.833)	0.099 (0.262)
Number of observations	124	100	90	50
Certificate I/II qualifications – engineering	-0.087 (0.880)	0.237 .	0.257 .	-0.136 .
Number of observations	16	9	9	4
Certificate I/II qualifications – other	0.098*** (0.000)	0.030 (0.250)	0.114*** (0.000)	0.043 (0.144)
Number of observations	1527	1268	1126	560

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 58 Returns from education for the 2005 SET (ASCED) by field of education relative to less than Year 12, males**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Advanced diploma/diploma – business	0.053* (0.077)	0.101* (0.054)	0.074 (0.173)	0.366*** (0.000)
Number of observations	320	312	267	218
Advanced diploma/diploma – engineering	0.048 (0.128)	0.058 (0.283)	0.083 (0.111)	0.282*** (0.000)
Number of observations	278	271	247	182
Advanced diploma/diploma – other	0.072*** (0.005)	-0.084* (0.058)	0.046 (0.321)	0.209*** (0.000)
Number of observations	430	417	327	252
Certificate III/IV qualifications – business	0.058* (0.071)	0.062 (0.290)	0.106* (0.062)	0.130* (0.056)
Number of observations	246	242	204	172
Certificate III/IV qualifications – engineering	0.048*** (0.000)	-0.042** (0.013)	0.011 (0.530)	0.157*** (0.000)
Number of observations	2702	2632	2023	1670
Certificate III/IV qualifications – other	0.045* (0.054)	0.004 (0.904)	0.007 (0.863)	0.001 (0.975)
Number of observations	625	600	494	425
Certificate I/II qualifications – business	0.032 (0.442)	0.070 (0.283)	0.167*** (0.007)	0.120 (0.110)
Number of observations	200	191	157	136
Certificate I/II qualifications – engineering	0.033 (0.313)	0.060 (0.237)	0.042 (0.439)	0.050 (0.386)
Number of observations	314	297	221	212
Certificate I/II qualifications – other	-0.072* (0.071)	0.047 (0.411)	-0.057 (0.365)	0.035 (0.564)
Number of observations	280	248	202	174

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 59 Returns from education for the 2005 SET (ASCED) by field of education relative to less than Year 12, females**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
Advanced diploma/diploma – business	0.152*** (0.001)	0.206*** (0.000)	0.196*** (0.000)	0.236*** (0.000)
Number of observations	314	283	253	168
Advanced diploma/diploma – engineering	0.162 (0.521)	0.249 (0.463)	-0.062 (0.878)	0.072 .
Number of observations	26	26	24	18
Advanced diploma/diploma – other	0.065*** (0.007)	0.052 (0.122)	0.091*** (0.009)	0.245*** (0.000)
Number of observations	859	767	653	315
Certificate III/IV qualifications – business	0.150*** (0.000)	0.236*** (0.000)	0.237*** (0.000)	0.114*** (0.001)
Number of observations	553	505	458	319
Certificate III/IV qualifications – engineering	0.161** (0.041)	0.021 (0.851)	0.010 (0.937)	0.092 (0.510)
Number of observations	94	88	78	34
Certificate III/IV qualifications – other	0.096*** (0.000)	-0.019 (0.564)	0.038 (0.296)	0.102** (0.026)
Number of observations	912	802	664	306
Certificate I/II qualifications – business	0.064*** (0.008)	0.114*** (0.001)	0.106*** (0.002)	0.122*** (0.002)
Number of observations	940	807	700	355
Certificate I/II qualifications – engineering	-0.028 (0.881)	-0.226 (0.505)	-0.165 (0.706)	-0.088 .
Number of observations	34	26	22	7
Certificate I/II qualifications – other	-0.034 (0.407)	-0.014 (0.810)	0.014 (0.820)	0.129 (0.107)
Number of observations	353	281	238	126

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

# Outcomes for mature-age students

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The analysis of returns from education thus far has focused on the ‘average’ person. Most people obtain their educational qualifications early in life, following the standard route of completing high school and then moving onto vocational or higher education. However, there is also a significant proportion of individuals in the Australian population who left school prior to Year 12, or just after completing Year 12, and who immediately joined the workforce. These individuals might at some point consider gaining higher qualifications or re-skilling.

Research on the labour market returns from education at mature ages is rather sparse, both in Australia and overseas. Two studies in Australia do attempt to analyse this issue. Headey and Warren (2008) compare changes in earnings of individuals who do and do not undertake some further education over the period 2000 to 2005. They find that those who do undertake some further education have larger earnings gains over this period, particularly those who undertook the education early in that period. They interpret this as some evidence that it may take some time for education to pay off. Karmel and Woods (2004) investigate the effect of obtaining formal qualifications later in life on employment rates and the probability of working full-time. They find that education later in life is associated with as good or even better employment outcomes than those obtaining education earlier in life, particularly for females. Sub-diploma qualifications do not have a positive effect on employment rates, however. The authors employ the 2001 Survey of Education and Training in their analysis. They did not look at earnings, only employment rates and the probability of working full-time.

International studies of the returns from mature-age education have found a variety of effects. Studies of delaying post-secondary study from straight after high school until later, but still during the twenties age range in the United States and the United Kingdom found essentially no negative effects of delay. In other words, earnings were just as high at around age 30 years for those who delayed as for those that did not. These studies include Blundell et al. (2000) in the United Kingdom, and Light (1995) and Leigh and Gill (1997) in the United States. Delay of study to the thirties age range, however, resulted in very little earnings benefits of further education in the UK (Jenkins et al. 2003; Silles 2007). Earnings by age 42 years were found to be the same for those who undertook further education as those that did not. Jenkins et al. (2003) did find, however, that education during an individual’s thirties did increase the probability of being employed at aged 42 if the individual was not employed at aged 33 years. Jacobson, LaLonde and Sullivan (2005) found that there were earnings returns from undertaking vocational-type education at community colleges in the US among workers who were displaced (made redundant). Zhang and Palameta (2006) found earnings gains for workers who completed qualifications in Canada at mature ages.

The results in this section attempt to shed more light on this important policy issue. Specifically, we ask what the returns from VET qualifications in Australia are for individuals who obtained their qualifications later in life. Such training or skills upgrading could be viewed as an attempt to provide a form of employment-protection insurance.

In order to empirically implement this using the Survey of Education and Training data, we use information on age and when they obtained qualifications to create different subgroups, and perform matching on those subgroups. For example, using the 1997 Survey of Education and

Training data, in order to compute zero to two-year impacts of VET for individuals who are currently aged 30–64 years (that is, the time between 1997, when the survey was conducted, and 1995–97, the period when they obtained their qualifications), we can set the treatment group as 30 to 64-year-olds who completed their VET qualifications some time between 1995 and 1997, with the comparison group as 30 to 64-year-olds who have no qualifications, and estimate differences in outcomes in 1997.

Similarly, in order to estimate three-to-seven year impacts of VET for individuals who are currently aged 30–64 years (that is, the time between 1997 and 1990–94), we can set the treatment group as 30 to 64-year-olds who completed their VET qualifications some time between 1990 and 1994, and the comparison group as 30 to 64-year-olds who have no qualifications, and estimate differences in outcomes in 1997.

We focus on persons in the 30 to 64 years age group to estimate between one to eight years of follow-up impacts in each of the Survey of Education and Training data sets because of sample size constraints and the way information on the date qualifications was collected in the data (otherwise we would use finer age breakdowns and follow-up periods). In theory, the survey design allows us to obtain long-term impact estimates for a variety of age ranges. But in practice, we are constrained by the sample sizes. When sample sizes are small, any estimates that are obtained are likely to be unreliable.

In this section, we only focus on sub-diploma VET qualifications because sample sizes do not permit us to create a large enough sample of mature-age students with diploma qualifications. We also pool males and females together due to sample size constraints.

Note that as the sample sizes employed in this section are small, all results should be interpreted with caution.

## Returns for mature-age students, Year 12 as comparison group

Recall that, when examining the average returns for all students, we found that there was no benefit in obtaining a basic or skilled vocational qualification (ABSCQ) or a certificate I to IV qualification (ASCED) if a Year 12 qualification was already held. Similarly, the results in this section suggest that, for mature-age students, there is no benefit to be expected from obtaining sub-diploma VET qualifications.

The impact estimates in tables 60 to 69 suggest that, in the majority of outcomes examined, mature-age students can expect a negative outcome relative to the counterfactual scenario of not pursuing any higher education after completing high school. For example, in 2005, the one-to-two year follow-up impact for average log weekly earnings for a certificate III/IV qualification was -10.7% (see table 64).<sup>8</sup> Furthermore, the longer run three-to-five-year follow-up impact was also still negative (-5.5%), although this was not statistically significant.

Therefore, for persons with a Year 12 qualification who are considering obtaining sub-diploma VET qualifications, the tentative conclusion appears to be that one should not expect any positive labour market outcomes to arise as a result of obtaining those qualifications.

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<sup>8</sup> One-to-two-year follow-up impacts in this case are obtained by comparing earnings outcomes in 2005 between treatment group members that completed their VET qualifications some time in 2004–05 and comparison group members.

**Table 60 Mature-age returns from education for the 1993 SET (ABSCQ) relative to Year 12 completers**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–3 years follow-up				
Skilled vocational qualifications	-0.094 (0.235)	-0.082 (0.332)	-0.117 (0.236)	-0.056 (0.678)
Number of observations	84	72	64	37
Basic vocational qualifications	-0.096 (0.247)	0.032 (0.780)	-0.044 (0.697)	0.056 (0.705)
Number of observations	110	78	78	42
4–8 years follow-up				
Skilled vocational qualifications	-0.029 (0.482)	0.026 (0.545)	-0.016 (0.752)	-0.040 (0.499)
Number of observations	242	222	187	130
Basic vocational qualifications	0.054 (0.285)	-0.044 (0.495)	-0.070 (0.296)	0.091 (0.243)
Number of observations	190	170	147	90

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 61 Mature-age returns from education for the 1997 SET (ABSCQ) relative to Year 12 completers**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–3 years follow-up				
Skilled vocational qualifications	0.013 (0.902)	0.107 (0.461)	0.048 (0.763)	-0.166 (0.286)
Number of observations	48	46	35	27
Basic vocational qualifications	-0.041 (0.372)	0.044 (0.527)	-0.121* (0.068)	-0.142* (0.055)
Number of observations	215	179	174	110
4–7 years follow-up				
Skilled vocational qualifications	-0.022 (0.648)	0.079 (0.320)	0.020 (0.802)	-0.084 (0.316)
Number of observations	136	134	108	86
Basic vocational qualifications	-0.078** (0.013)	0.020 (0.673)	-0.042 (0.361)	-0.064 (0.169)
Number of observations	429	371	328	209

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 62 Mature-age returns from education for the 2001 SET (ABSCQ) relative to Year 12 completers**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–2 years follow-up				
Skilled vocational qualifications	0.067 (0.459)	0.051 (0.729)	-0.177 (0.241)	-0.328 (0.129)
Number of observations	62	60	54	29
Basic vocational qualifications	-0.050 (0.549)	-0.125 (0.215)	-0.164 (0.132)	-0.072 (0.649)
Number of observations	104	86	80	40
3–7 years follow-up				
Skilled vocational qualifications	0.016 (0.700)	-0.107 (0.104)	-0.102 (0.128)	-0.186*** (0.008)
Number of observations	232	211	178	96
Basic vocational qualifications	-0.021 (0.545)	-0.006 (0.903)	-0.027 (0.603)	-0.130** (0.015)
Number of observations	371	325	284	172

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 63 Mature-age returns from education for the 2001 SET (ASCED) relative to Year 12 completers**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–2 years follow-up				
Certificate III/IV	0.037 (0.587)	0.008 (0.936)	-0.130 (0.183)	-0.275*** (0.003)
Number of observations	108	98	94	56
Certificate I/II	-0.180 (0.335)	-0.227 (0.388)	-0.219 (0.434)	-0.494 .
Number of observations	42	30	31	18
3–7 years follow-up				
Certificate III/IV	-0.017 (0.634)	-0.076 (0.154)	-0.057 (0.267)	-0.058 (0.308)
Number of observations	357	321	286	156
Certificate I/II	-0.005 (0.907)	0.014 (0.824)	-0.077 (0.237)	-0.183*** (0.009)
Number of observations	252	218	196	120

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 64 Mature-age returns from education for the 2005 SET (ASCED) relative to Year 12 completers**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–2 years follow-up				
Certificate III/IV	0.011 (0.808)	0.091 (0.211)	0.049 (0.477)	-0.113 (0.143)
Number of observations	178	168	158	104
Certificate I/II	-0.263 (0.194)	0.265 (0.471)	-0.294 (0.738)	-0.378 (0.602)
Number of observations	38	28	21	20
3–5 years follow-up				
Certificate III/IV	0.049* (0.071)	0.003 (0.949)	0.050 (0.225)	-0.057 (0.234)
Number of observations	497	472	386	264
Certificate I/II	-0.019 (0.742)	-0.040 (0.658)	-0.026 (0.785)	-0.113 (0.248)
Number of observations	133	122	104	66

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Returns for mature-age students, less than Year 12 as comparison group

When the comparison group used are persons with less than 12 years of schooling (see tables 65 to 69) instead of Year 12 completers, the results change considerably. Specifically, there appear to be some longer-term positive impacts on earnings and employment from obtaining VET qualifications. In 2001 and 2005, for example, the estimated impacts over the longer term (three to seven or three to five years of follow-up respectively) for average log weekly earnings are positive and statistically significant. In 2001, the premium was 15.6%. In 2005, the return was 10.8%. Furthermore, using the older ABSCQ classification scheme, in 2001 obtaining basic vocational qualifications led to a 6.4 percentage point increase in the probability of being employed and a 9.4 percentage point increase in the probability of being in permanent employment (table 67).

However, keep in mind that, given the generally small sample sizes for the estimates obtained in this section, these results should be interpreted with caution. More work on the effects of education and training on mature-age workers in Australia remains to be done before evidence-based policy for this important subgroup of the population can properly be formulated.

**Table 65 Mature-age returns from education for the 1993 SET (ABSCQ) relative to less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–3 years follow-up				
Skilled vocational qualifications	0.028 (0.757)	0.014 (0.855)	-0.014 (0.895)	0.056 (0.696)
Number of observations	84	72	64	38
Basic vocational qualifications	-0.021 (0.810)	0.049 (0.673)	0.002 (0.986)	0.090 (0.458)
Number of observations	109	78	80	42
4–8 years follow-up				
Skilled vocational qualifications	0.064 (0.175)	0.062 (0.153)	0.066 (0.239)	0.135* (0.078)
Number of observations	242	222	187	130
Basic vocational qualifications	0.100* (0.063)	0.013 (0.836)	0.048 (0.511)	0.184** (0.023)
Number of observations	189	170	148	90

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 66 Mature-age returns from education for the 1997 SET (ABSCQ) relative to less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–3 years follow-up				
Skilled vocational qualifications	0.126 (0.308)	0.075 (0.638)	0.101 (0.571)	0.084 (0.638)
Number of observations	48	45	36	27
Basic vocational qualifications	0.052 (0.311)	0.082 (0.233)	-0.008 (0.904)	0.057 (0.433)
Number of observations	215	179	173	109
4–7 years follow-up				
Skilled vocational qualifications	0.097 (0.116)	0.065 (0.408)	0.077 (0.369)	0.152* (0.066)
Number of observations	135	134	107	82
Basic vocational qualifications	0.022 (0.543)	0.032 (0.500)	0.050 (0.292)	0.124*** (0.009)
Number of observations	430	371	327	210

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 67 Mature-age returns from education for the 2001 SET (ABSCQ) relative to less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–2 years follow-up				
Skilled vocational qualifications	0.100 (0.350)	-0.039 (0.785)	-0.090 (0.541)	-0.156 (0.437)
Number of observations	62	60	54	30
Basic vocational qualifications	-0.031 (0.701)	-0.022 (0.844)	-0.036 (0.730)	0.146 (0.338)
Number of observations	106	85	80	40
3–7 years follow-up				
Skilled vocational qualifications	0.072 (0.106)	-0.075 (0.260)	0.016 (0.819)	0.060 (0.426)
Number of observations	232	211	178	95
Basic vocational qualifications	0.064* (0.086)	0.072 (0.152)	0.094* (0.067)	0.046 (0.398)
Number of observations	373	327	290	172

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 68 Mature-age returns from education for the 2001 SET (ASCED) relative to less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–2 years follow-up				
Certificate III/IV	0.066 (0.363)	-0.001 (0.996)	-0.049 (0.627)	-0.039 (0.697)
Number of observations	107	98	94	56
Certificate I/II	-0.076 (0.672)	-0.006 (0.986)	0.003 (0.991)	0.126 .
Number of observations	42	30	31	17
3–7 years follow-up				
Certificate III/IV	0.031 (0.412)	-0.030 (0.570)	0.045 (0.391)	0.156*** (0.008)
Number of observations	357	321	286	156
Certificate I/II	0.082* (0.085)	0.044 (0.481)	0.061 (0.343)	-0.013 (0.841)
Number of observations	260	225	199	120

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 69 Mature-age returns from education for the 2005 SET (ASCED) relative to less than Year 12**

	Employment	Full-time/ part-time employment	Permanent/ casual employment	Log weekly earnings
1–2 years follow-up				
Certificate III/IV	0.073 (0.128)	0.066 (0.359)	0.048 (0.480)	0.114 (0.124)
Number of observations	179	170	160	104
Certificate I/II	-0.198 (0.290)	0.182 (0.526)	0.111 (0.789)	-0.145 (0.856)
Number of observations	38	28	22	19
3–5 years follow-up				
Certificate III/IV	0.074*** (0.009)	0.045 (0.307)	0.091** (0.038)	0.114** (0.022)
Number of observations	498	472	388	263
Certificate I/II	-0.005 (0.931)	0.060 (0.507)	-0.001 (0.995)	-0.018 (0.873)
Number of observations	134	122	104	66

Note: p-values in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

# Conclusion

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This report assessed the effects of completing a VET qualification on employment and earnings, using four different years of data from the ABS Surveys of Education and Training. To provide useful information to persons with less than 12 years of schooling and school completers who are contemplating the decision to invest in VET qualifications, comparisons in labour market outcomes are made relative to both these groups throughout the report. A short section with estimates of returns from mature-age students was also included to provide guidance to mature-age students deciding whether or not to undertake vocational education and training.

The report provided detailed estimated impacts on four outcomes, three of them employment outcomes and one an earnings outcome. By and large, across the four different years of SET data, a consistent finding emerged. This finding is that, if one already is a school completer, then enrolling in vocational education and training to obtain sub-diploma VET (certificate I–IV) qualifications is unlikely to be beneficial in terms of labour market outcomes. Only obtaining qualifications at the diploma level and above is likely to provide a positive return.

On the other hand, if an individual only has less than 12 years of school education, then there are some concrete benefits to be obtained from all levels of VET qualifications, including the lower-level certificate I/II qualifications. In terms of choosing the field of education that is likely to provide the highest rates of return, it appears that business, engineering, architecture, building, and automotive are all fields that lead to tangible positive returns.

The finding that, relative to Year 12 completers, there are no employment or earnings benefits in completing a certificate III/IV qualification differs from the findings in some previous research. See, for example, Karmel and Nguyen (2007), Karmel (2008) and Long and Shah (2008), who find positive benefits when making similar comparisons. On the other hand, these findings are consistent with the findings in Ryan (2002a) and Leigh (2008), who also find that, by comparison with Year 12 completers, skilled vocational qualifications or certificate III/IV qualifications do not result in employment or earnings benefits. Perhaps an important issue to consider in assessing the value of certificate III/IV qualifications is whether school completers or non-completers are more appropriate as a comparison group. An additional complication that needs to be taken into account is that many students undertaking certificate III/IV qualifications are studying part-time and may be working in lower wage ‘stepping stone’ jobs in order to balance their work–study routine. If this is the case, there will be a downward bias when attempting to estimate the potential returns from such qualifications.

For mature-age students contemplating obtaining a VET qualification, it appears that it is only worthwhile to do so if one has less than 12 years of schooling and one is intending to enrol in VET courses at the certificate III level or higher. Furthermore, in such instances, it might take a year or two before any positive effects of the investment in education might materialise.

There have not been dramatic changes over time in the returns from VET qualifications. Between 1993 and 1997 the earnings premium of associate diploma holders relative to both Year 12 completers and non-school completers was positive and of a similar magnitude. Similarly, between 2001 and 2005, the earnings premium of advanced diploma/diploma holders relative to both Year

12 completers and non-school completers were somewhat constant. It is harder to compare changes that took place pre- and post-1997 because of the introduction of AQF and the re-labelling of credentials.

There were more fluctuations over time in the earnings premium to the sub-diploma VET (certificate I–IV) qualifications. But relative to non-school completers, it is clear that over the entire period 1993 to 2005, there were statistically significant returns from having such VET qualifications.

Some caveats to the general findings in this report are worth noting. The statistical approach used in this study is based on the assumption that all measured variables that affect VET participation and the outcomes considered are available and used in our models. However, many unmeasured variables related to ability and motivation are not included in our models (because data are not available), which implies that estimates in this study could be biased. In addition, performing the analysis separately by gender and field of education often results in small sample sizes, implying that some results might not be very robust.

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# Support document details

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Additional information relating to this research is available in *Analysis of private returns to vocational education and training: Support document*. It can be accessed from NCVER's website <<http://www.ncver.edu.au/publications/2221.html>> and contains detailed regression results that correspond to tables 4 to 59 of the report.

# Appendix A: How propensity-score matching works

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Assume that each individual has two potential outcomes:  $Y(1)$  in the case that he or she obtained a VET qualification and  $Y(0)$  if the same person did not. The latter is often referred to as the ‘counterfactual’ in the evaluation literature for those who obtained VET qualifications. The causal effect is then given by the comparison of  $Y(1)$  and  $Y(0)$ . Let  $D$  represent the treatment variable, taking a value of 1 if the individual has a VET qualification and 0 otherwise. One parameter of interest for policy-makers is referred to as the average treatment effect on the treated (ATT) and can be expressed as:

$$ATT = E(Y(1) - Y(0) | D = 1) = E(Y(1) | D = 1) - E(Y(0) | D = 1)$$

In our setting, this would be the effect of a VET qualification on labour market outcomes for those who undertook VET studies.

However, in reality, only one of these two outcomes is observable for each individual, making a direct comparison impossible. To estimate ATT, one needs to have an estimate of  $E(Y(0) | D=1)$ . A naïve approach uses  $E(Y(0) | D=0)$  as an estimate for  $E(Y(0) | D=1)$ .<sup>9</sup> However, simply comparing people with VET qualifications and those without VET qualifications is a potentially biased approach because it is likely that certain individuals self-select themselves into the vocational education system, while others choose not to obtain any more schooling after a certain point or choose to pursue a university education instead. These groups of individuals are potentially quite different. In the econometrics literature, this is known as the problem of selection bias and exists because

$$E(Y(0) | D = 1) \neq E(Y(0) | D = 0)$$

One econometric approach to solving the problem of selection bias involves the use of matching methods. Matching estimators is justifiable when an assumption that potential outcomes are independent of treatment receipt conditional on a set of observable characteristics is satisfied. More formally, this important condition is known as the Conditional Independence Assumption (CIA):

$$Y(0) \perp D | X$$

The fulfilment of this assumption helps solve the problem of selection bias because after conditioning on the covariates,

$$E(Y(0) | X, D = 1) = E(Y(0) | X, D = 0) = E(Y(0) | X)$$

Although exact matching on covariates is possible as an approach to deal with the problem of selection bias, it can sometimes lead to difficulties due to the problem known as the curse of dimensionality. In other words, there could be many empty cells and little overlap in the distribution of covariates between treatment and comparison groups. As an alternative, many researchers have adopted a matching approach known as propensity-score matching that matches

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<sup>9</sup> Incidentally, this is often the approach used in most IRR studies.

individuals based on a single variable, the propensity score. The term ‘propensity score’ is the terminology used to refer to the probability of being in the treatment group. This is the approach we adopt in our analysis of the returns from VET in this report.

For propensity-score matching, a further statistical assumption that is required is that the propensity score is strictly less than one so that matches can be found for all treated individuals.

Propensity-score-matching is a semi-parametric alternative to standard linear OLS regression. Although both regression and matching rely on a similar selection on observables assumption for identification of the average treatment effect, matching allows one to relax the implicit linear functional form assumption in regression. Matching also allows an examination of the ‘support’ condition to determine the extent to which individuals with VET qualifications are similar to those with lower schooling. Regression techniques do not allow easy detection of this problem, sometimes leading to estimating counterfactuals that require too much out-of-sample projection of the available data. Another advantage of matching over standard regression-based techniques is that it provides the researcher with flexibility in choosing how to aggregate heterogeneous impacts by the choice of weights so that policy parameters like the ATT can be estimated. Standard regression models impose a particular weighted average on the assumption of heterogeneous treatment effects, and it is not clear that this weighted average parameter is a parameter a policy-maker would be most interested in.

Black and Smith (2004) is a recent application of the propensity-score approach to the related issue of examining the labour market effects of college quality. Cobb-Clark and Crossley (2003) provide a useful discussion of the differences in assumptions underlying standard linear regression, matching and instrumental variable approaches when these methods are used for evaluation purposes.



# Appendix B:

## The two-step matching/ regression approach

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In the *first* step, matching is done using covariates that can plausibly affect the decision to undertake VET. The propensity score is estimated using a probit model, where the dependent variable is VET participation (the main report discusses in detail how this binary variable denoting the various treatment and comparison groups is defined) and the independent variables are given below. For each of the Survey of Education and Training years, the following variables have been identified:

1993

Age (20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–64), gender, area of usual residence (= 1 if capital city), birthplace (= 1 if non-English speaking country), English language background (= 1 if English is first language), and state.

1997

Age (20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–64), gender, birthplace (=1 if non-English speaking country), English language background (= 1 if English is first language), and state.

2001

Age (20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–64), gender, birthplace (= 1 if non-English speaking country), English language background (= 1 if English is first language), father born overseas, mother born overseas, and state.

2005

Age (20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–64), gender, birthplace (= 1 if non-English speaking country), English language background (= 1 if English is first language), father born overseas, mother born overseas, and state.

Although state and area of residence at the time of the survey, and at the time they were deciding whether or not to undertake VET, is likely to be different for some people, we assume they are the same in order to use the area variables as matching variables.

In the second step, we use an augmented set of variables for the regression analysis—variables from the first step, the weights obtained from matching in the first step, and variables that might plausibly affect the outcome of interest (but not the decision to undertake VET).

1993

Marital status (= 1 if married), Age of youngest child (0–2, 3–4, 5–9, 10–14), and union status.

1997

Marital status (= 1 if married), Age of youngest child (0–2, 3–4, 5–9, 10–14), union status, and disability status.

2001

Marital status (= 1 if married), Age of youngest child (0–2, 3–4, 5–9, 10–14), union status, and disability status.

2005

Marital status (= 1 if married), Age of youngest child (0–2, 3–4, 5–9, 10–14), union status, and disability status.

The regression adjustment procedure in the report is based on OLS, regardless of whether the outcome is binary or continuous. This is the standard practice in randomised experiments and matching studies, where the purpose of the regression is purely to soak up any residual variation in the covariates. One might view it as an augmented two-sample t-test with covariates. This combination of matching and regression using appropriate comparison groups helps us obtain estimates of the effects of VET qualifications.

# Appendix C:

## Sample sizes of treatment and comparison groups in the 1993, 1997, 2001 and 2005 SET data

**Table C1 Sample sizes of treatment and comparison groups in the 1993 SET data (ABSCQ)**

<b>Treatment group</b>	Business	Engineering/ construction	Other	Total
Bachelor degree and above	-	-	-	1689
Assoc diploma	148	282	362	792
Skilled vocational	209	1554	806	2569
Basic vocational	526	41	434	1001

<b>Comparison group:</b>	
Year 12	2201
< Year 12	6788

**Table C2 Sample sizes of treatment and comparison groups in the 1997 SET data (ABSCQ)**

<b>Treatment group</b>	Business	Engineering/ construction	Other	Total
Bachelor degree and above	-	-	-	2032
Assoc diploma	195	139	221	555
Skilled vocational	55	1563	368	1986
Basic vocational	907	330	730	1967

<b>Comparison group:</b>	
Year 12	1807
< Year 12	5566

**Table C3 Sample sizes of treatment and comparison groups in the 2001 SET data (ABSCQ)**

<b>Treatment group</b>	Business	Engineering/ construction	Other	Total
Bachelor degree and above	-	-	-	2359
Assoc diploma	223	151	237	611
Skilled vocational	125	1518	540	2183
Basic vocational	704	157	581	1442

**Comparison group:**

Year 12	1660
< Year 12	4582

**Table C4 Sample sizes of treatment and comparison groups in the 2001 SET data (ASCED)**

<b>Treatment group</b>	Business	Engineering/ construction	Other	Total
Bachelor degree and above	-	-	-	2403
Advanced diploma/diploma	300	185	596	1090
Certificate III/IV	252	1624	686	2566
Certificate I/II	76	41	1129	1247

Note: Total is not same as the sum of the fields because a category 'field not determined' was excluded from the 'other' category. The majority of persons with certificate I/II qualifications were classified as being in 'mixed field programs' in the 2001 SET, which have been put into the 'other' category.

**Comparison group:**

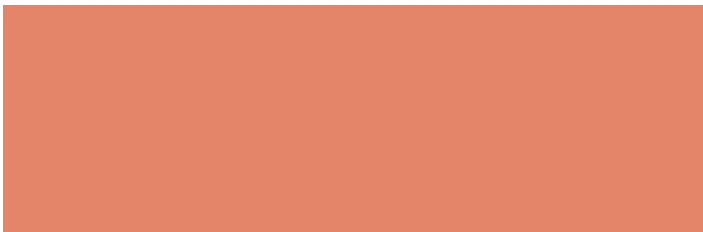
Year 12	1635
< Year 12	4530

**Table C5 Sample sizes of treatment and comparison groups in the 2005 SET data (ASCED)**

<b>Treatment group</b>	Business	Engineering/ construction	Other	Total
Bachelor degree and above	-	-	-	2487
Advanced diploma/diploma	318	152	645	1115
Certificate III/IV	400	1404	769	2573
Certificate I/II	570	174	317	1061

**Comparison group:**

Year 12	1582
< Year 12	3534



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