



Australian Government

Department of Education, Science and Training

The impact of additional educational qualifications for early school leavers

**Tue Gørgens
Chris Ryan
Research School of Social Sciences
Australian National University**

April 2006

© Australian Government 2006

ISBN: 0 642 77609 1

ISBN: 0 642 77610 5 (Internet version)

This work is copyright. You may download, display, print and reproduce this material in unaltered form (retaining this notice) for your personal, non-commercial use and use with your organisation. All other rights are reserved. Requests and inquiries concerning reproduction and rights should be addressed to Commonwealth Copyright Administration, Attorney General's Department, Robert Garran Offices, National Circuit, Barton ACT 2600 or posted at <http://www.ag.gov.au/cca>.

The Australian Government Department of Education, Science and Training funded this project under the Departmental Research Programme.

The views expressed are those of the authors and do not necessarily represent the views of the Australian Government Department of Education, Science and Training. The authors thank officers from the Department who provided comments on earlier drafts of this report.

Corresponding author

Contact: chris.ryan@anu.edu.au

Research School of Social Sciences

Australian National University

0200 Canberra ACT

(02 6125 3881)

CONTENTS

Tables	ii
Figures.....	ii
Executive Summary	iii
INTRODUCTION.....	1
2. CONCEPTUAL FRAMEWORK	2
3. LITERATURE ON EDUCATION EFFECTS ON LABOUR MARKET SUCCESS	5
Impact of qualifications on labour market outcomes among the general population.....	5
Impact of educational qualifications for the unemployed.....	7
Implications of the literature review for this study	9
4. DATA AND METHODOLOGY	11
Methodology	11
Data used in the study	12
Observed outcomes in the data associated with different schooling and qualifications attained.....	15
5. REGRESSION RESULTS	21
Reporting the results from the labour market outcomes equation.....	21
General effects of qualifications on labour market outcomes.....	22
VET-qualification effects among those with an experience of unemployment	24
Other results and refinements to the regression equations.....	28
VET qualification wage effects.....	31
6. CONCLUSION AND POLICY IMPLICATIONS	33
REFERENCES.....	35
APPENDIX 1: Methodology	38
APPENDIX 2: Description of the samples and variable definitions.....	40
APPENDIX 3: Detailed Tables Of Regression Results	43

Tables

Table 1	Outcomes analysed	4
Table 2	Percentage of sample in employment at age 22, including comparison with similar ABS data	13
Table 3	Schooling, qualification and unemployment experience composition of the sample	14
Table 4	Sample sizes for analysis	17
Table 5	Summary of key outcome measures for the sample at around age 22, according to schooling, qualifications and unemployment experience	18
Table 6	Summary of key outcome measures for the sample at about age 22, by whether completed Year 12, attainment of post school qualifications and experience of unemployment	19
Table 7	Percentage of the sample at about age 22 in 5 mutually exclusive education and employment categories, by whether completed Year 12, attainment of post school qualifications and experience of unemployment	20
Table 8	Estimated probabilities for a typical individual in the sample of being in one of 5 mutually exclusive labour market states at about age 22, by level of schooling and qualification completed and experience of unemployment	22
Table 9	Estimated probabilities for typical males and females in the sample of being in one of 5 mutually exclusive labour market states at about age 22, by level of schooling and qualification completed	25
Table 10	Estimated probabilities for a typical individual in the sample of being in one of 5 mutually exclusive labour market states at about age 22, by level of schooling and VET qualification by experience of unemployment effects	26
Table 11	Summary of other important effects in the labour market outcome regressions	29
Table 12	Summary of VET wage effects	32
Table 2.1	Variable descriptions and summary statistics	41
Table 3.1	Multinomial logit equation of determinants of early twenties activities	43
Table 3.2	Wage regression results	44

Figures

Figure 1	Conceptual framework	3
----------	----------------------------	---

EXECUTIVE SUMMARY

This paper addresses two main research questions with direct implications for policy. First, what is the impact of education and training qualifications on the labour market outcomes achieved by early school leavers a few years after completing those qualifications? Second, what is the impact of these post-school qualifications on those early school leavers who previously experienced a substantial period of unemployment?

The policy background to this analysis lies in the welfare reform program implemented in Australia. A key question for policy-makers is whether to direct those on income support into labour market programs that might provide direct and immediate benefits through early labour force attachment or into education and training courses that might provide more sustained, but longer term benefits to individuals.

Data from two cohorts of young Australians are utilised to analyse the research questions addressed in the paper. These cohorts entered the labour market from the early and late 1990s respectively. The outcomes of individuals in this study are measured eight years after they were first observed to be in Year 9 at school, at about age 22 for most people. This timing allows us to observe the labour market outcomes of early school leavers, those who completed some qualification after leaving school and the initial destinations of individuals who completed three-year university degrees immediately after Year 12. The outcomes analysed consist of: whether individuals were employed full-time, part-time or not at all and/or engaged in study; and their wages.

The results suggest that the effect of VET qualifications on full-time employment rates are the same for those who do not complete Year 12 as on those who do, and are not different for early school leavers, either. Measured against the relevant comparison group, the increase in full-time employment rates for those with VET qualifications compared to those without are about the same across these groups, of the order of 10 to 13 percentage points.

Earlier spells of unemployment of six months or longer act to lower subsequent full-time employment rates. However, those who complete a VET-level qualification following a spell of such unemployment experience improved full-time employment rates compared with those who experience unemployment but do not complete later post-school qualifications. The increased probability of being employed full-time for those who complete a VET qualification after a spell of unemployment, compared with those who are unemployed but never complete a qualification, is also of the order of 10 to 13 percentage points, whether they complete Year 12 or not. There was also evidence of positive wage effects, but only through these employment effects. Whether these results can be generalised for other age groups in the population is unclear.

Overall, the results provide a positive assessment of the impact of VET qualifications on the full-time employment outcomes of individuals who complete them. The better results apparent in the actual data were robust across alternative specifications and remained after the background characteristics of individuals were taken into account, including factors such as school achievement levels, occupational ambitions among young people, earlier revealed intentions to study in VET and the potential impact of peer influences.

INTRODUCTION

If education leads to better labour market outcomes for individuals, as an extensive literature demonstrates, are these effects the same for different groups in the population? Do all courses provide benefits? Do early school leavers benefit from vocational courses that are not apprenticeships? Do those with poor literacy and numeracy skills benefit from these and other courses as much as those with good skills?

This paper aims to address these and related issues by examining the impact of educational qualifications on the labour market outcomes of young Australians. The early career experiences of young people in Australia are analysed according to whether they completed the highest level of secondary school, whether they undertook post-school qualifications and their experience of unemployment. The specific focus is on the effect of vocational education and training courses for early school leavers, including those who experience a substantial spell of unemployment, defined in this paper as an unemployment spell of six months or longer for individuals after they left school.

The paper therefore, addresses two main research questions with direct implications for policy. First, what is the impact of post-school qualifications on the labour market outcomes achieved by early school leavers a few years after completing the qualifications? Second, what is the impact of these qualifications on those early school leavers who previously experienced a substantial period of unemployment? The policy background to this analysis lies in the welfare reform program implemented in Australia. A key question for policy-makers is whether to direct those on income support into labour market programs that might provide direct and immediate benefits to individuals through accelerated labour force attachment or to direct them into education and training courses that might provide more sustained, longer term benefits for them.

In order estimate the impact of participation in education and training of individuals with different prior experiences, individuals need to be monitored over a series of years and the timing of their education and unemployment recorded. This usually requires access to detailed longitudinal data. Lack of suitable data has precluded analysis on this issue in Australia to date.¹ Sufficient data from the Longitudinal Surveys of Australian Youth (LSAY) now allow analysis of the experiences of young people into their early twenties. Therefore, this study uses these data, where cohorts of young Australians were followed as they left school, pursued further education and training and worked in the labour market into their early twenties. The outcomes of individuals in this study are measured eight years after the subjects were first observed to be in Year 9 at school, at about age 22 for most people. This timing allows us to observe the labour market outcomes of early school leavers and the initial destinations of individuals who completed some qualifications after leaving school, including a three year degree if they started the course immediately after completing Year 12. The results may therefore not represent the experiences of people who complete post-school education and training courses later in their careers. Nevertheless, our results are informative about the impact of courses of education and training for an important group in the population – those at the outset of their careers.

The next section sets out a simple schematic presentation of the issues involved in this analysis. Section 3 summarises literature relevant to this topic and Section 4 the data and methodology pursued to analyse it. Section 5 contains the results and Section 6 the conclusions and policy implications of this paper.

2. CONCEPTUAL FRAMEWORK

This Section sets out the main parameters of interest for this paper and what some of the difficulties of estimating them are. As set out in the introduction, the purpose of the paper is to estimate the benefits of completed vocational educational qualifications provided to specific groups of individuals, especially those who experience a substantial period of unemployment prior to their completion of their qualifications. A critical issue for this assessment is to be able to determine the timing of the spells of unemployment of individuals and when they undertook or completed their post-school studies.

In what follows, those who do not complete the highest level of school – Year 12 – are referred to as early school leavers. This should not be taken to mean that the regression analysis reported later in the paper ignores the grade or level when early leavers exit from school. However, this classification makes the characterisation of the issues involved in the analysis simpler.

Figure 1 provides a simplified characterisation of the links between the educational decisions made by young individuals and the eventual measurement of outcomes of interest for policy makers. First, school students may decide to complete Year 12 or not, denoted by '*Decision I*' in Figure 1.

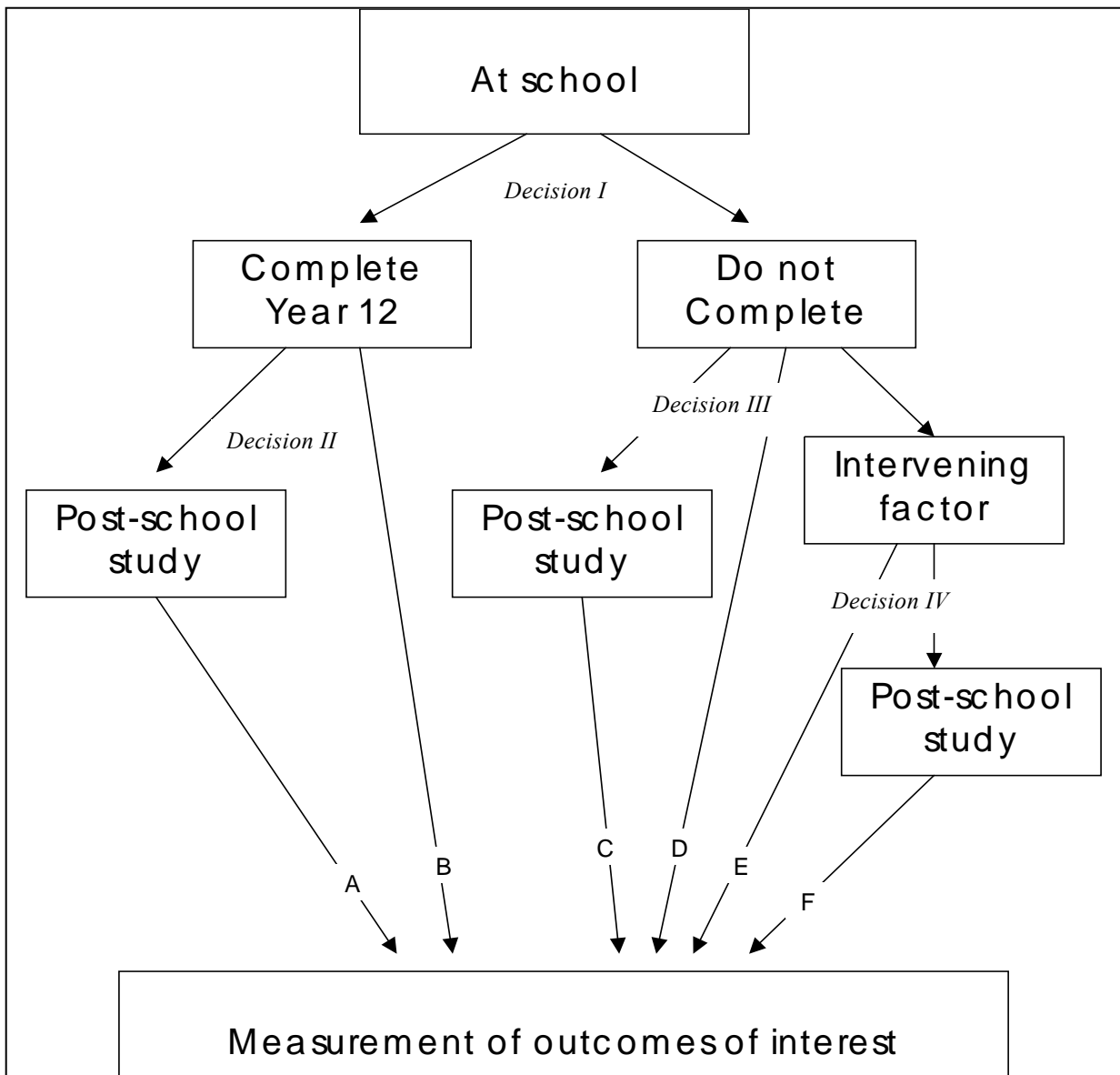
Those who do complete Year 12 face a further choice of whether to engage immediately in any post-school education or training, denoted by '*Decision II*'. Those who complete school and engage in post-school education or training follow the 'path' denoted as 'A' in Figure 1, those who do not follow path 'B'. Those who do not complete school may also engage in post-school education or training, denoted by '*Decision III*'. Among this group, those who engage in post-school education or training follow the 'path' denoted as 'C' in Figure 1, and those who do not follow path 'D'.

In addition, there may be interest in a subset of the group who do not complete school and who are subject to some special intervening factor, in this project a substantial period of unemployment. Some of those individuals may choose to re-enrol in education and training after that experience of unemployment ('*Decision IV*'), denoted by path 'F' in Figure 1, while those who do not re-enrol are shown in path 'E'.

The first issue for this paper is what is the magnitude of any beneficial effect of completion of post-school education and training qualifications by early school leavers. This involves a comparison of the outcomes of those who follow paths C or F with those who follow paths D or E. A subsidiary question of interest is whether the magnitude of the difference in outcomes is similar to those who complete similar types of qualifications in path A compared to those in path B.

The second issue for this paper is what is the magnitude of any beneficial effect of completion of post-school education and training qualifications by early school leavers who experience a significant period of unemployment. This involves a comparison of the outcomes of those who follow path F with those who follow path E. A further question of interest is whether the magnitude is similar to those who complete similar types of qualifications in path C compared to those in path D, that is, the effect of post-school study among individuals who do not experience the same period of unemployment.

Figure 1: Conceptual framework



The post-school qualifications considered here include university degrees and vocational education and training (VET)–level qualifications. VET qualifications include Certificates, Diplomas, trade certificates and traineeships undertaken by individuals, as well as any other qualifications undertaken by individuals at Technical and Further Education (TAFE) colleges and other training providers. This categorisation of qualifications reflects the classification used in the first cohort of data analysed here (see Section 4 below), which was collected prior to the development of the Australian Qualifications Framework.

Estimation of the effects of this qualification is complicated by a number of related phenomena. First, the background characteristics of those who make specific choices may differ substantially from those who choose the opposite course. If these characteristics are observed in the data, their effect can be removed from the estimated qualification effects via some type of multivariate analysis such as regression, the

approach pursued in this paper. If critical characteristics are not observed, then the estimated qualification effects will include an element that reflects a ‘selection bias’ arising from differences in the unobserved characteristics of the two groups (this missing data problem is also referred to as ‘unobserved heterogeneity’).

Second, if individuals make their various educational participation decisions with the eventual outcomes provided by the education in mind, especially their labour market outcomes, then the decisions to complete specific education or training qualifications are ‘endogenous’. Once more, any estimated qualification effect will include an element that reflects this ‘endogeneity bias’. This is closely related to the previous problem in that unobserved factors may mean that the individuals who choose specific courses of action do so because these unobserved factors mean that they are the individuals likely to benefit most from those courses of action. Regression techniques are sometimes available to deal with such endogeneity, but their application is often problematic. Discussion of the methodology used in this paper appears in Section 4 below and in Appendix 1. Attempts to deal with unobserved heterogeneity are described in the discussion of the results.

Over what outcomes should the extent of any benefits provided by these qualifications be measured? Principally, we distinguish the combination of labour market and study activities that individuals engage in when they reach their early twenties. The aim is to identify the characteristics of individuals, including their educational qualifications, that explain which of five categories individuals are observed in at that time. These categories are set out in Table 1, which also shows the relative size of these groups in the data used here. More than half of the individuals in the data are employed full-time by the time of their early twenties.² About one in six remain studying, with most of them also employed part-time. Sizable groups remain not studying and not employed or not studying and employed part-time. Another outcome analysed here, though given considerably less emphasis, is the weekly wage individuals who work receive, net of taxation.³ The focus is on the impact of educational qualifications on these wages.

Table 1: Outcomes analysed

	Participation in study	Participation in employment	Proportion of sample (%)
Category 1	Not studying	Not employed	12.2
Category 2	Studying	Not employed	5.3
Category 3	Studying	Employed part-time	11.2
Category 4	Not studying	Employed part-time	14.8
Category 5	Studying or not	Employed full-time	56.5
Number of observations			7,407

3. LITERATURE ON EDUCATION AND LABOUR MARKET SUCCESS

The focus of this paper is on the magnitude of the benefits provided by post-school qualifications among individuals whose experiences are somewhat atypical – those who leave school early and/or experience a substantial spell of unemployment. Consequently, after an introductory section, this review of the literature deals principally with studies that might be described as away from the mainstream of analyses of the impact of education and training qualifications on individual outcomes. These studies deal with persistence of disadvantage, late career completion of qualifications and the effects of participation in labour market programs.

Impact of qualifications on labour market outcomes among the general population

General Results

There is an extensive literature that indicates that those with higher levels of education experience better labour market outcomes than others. In Australia, research by the Australian Council for Educational Research (ACER) has consistently found that those who complete Year 12 experience better labour market outcomes than those who do not (that is combined paths A and B from Figure 1 versus combined paths C, D, E and F – see, for example, Lamb 1996, Marks and Fleming 1998a, 1998b). Among the group who complete Year 12 in Australia, those who undertake further studies, particularly at university, experience better outcomes than those who do not – that is the outcomes of those pursuing path A tend to exhibit better labour market outcomes than those who pursue path B (Ryan 2001a, 2001b, Marks and Fleming 1998a, 1998b).

Among those who do not complete Year 12, those who undertake further study – paths C and F – appear to experience better labour market outcomes than those who do not, that is those who follow paths D and E (Ryan 2001b). However, many studies find that these benefits are more substantial for males than females, especially in relation to vocational education and training qualifications (for example Ryan 2001a, 2001b, Lamb, Long and Malley 1998 and Preston 1997). Further, the better outcomes are most apparent immediately after individuals complete their qualifications and may fade with time, though whether that reflects something about the skills developed via the qualification or the post-course experience of individuals is unclear.

Marks *et al.* (2003) use one of the cohorts of data analysed in this study, the 1975 Youth in Transition cohort to examine the experiences of 20 to 25 year old Australians. They study the determinants of time spent in full-time employment and unemployment in any year. They report positive effects on time spent in full-time employment for Apprenticeships/Traineeships and Diplomas. Other types of VET qualifications did not improve time spent in full-time employment but they had positive but weak effects on time spent unemployed.

Recent British studies of the returns to vocational qualifications suggest that some very low level qualifications have little or negative returns for individuals in general, but may provide benefits to low-ability individuals (Dearden, McGranahan and Sianesi 2004). These courses are also often ‘stepping-stones’ to further participation. More generally, Dearden, McIntosh, Myck and Vignoles (2002) found that while the return to ‘academic’ qualifications (defined as university and A and O levels in that study) did not vary

according to individual ability, those for vocational qualifications did, being higher for low ability individuals.

Persistence of disadvantage

Bradley, Crouchley and Oskrochi (2003) found that many unskilled individuals in Britain tended to cycle through spells of employment in low-skilled jobs, unemployment and spells out of the labour force. Stewart and Swaffield (1999) similarly found evidence of individuals in Britain cycling through periods of low paid employment and joblessness. The results in Dunlop (2000) for Australia were similar – twice as many low paid workers enter joblessness the following year than high paid workers. Those who were unemployed job seekers but gained employment entered much less stable forms of employment than others in the general population who changed jobs and they also exhibited less upwards earnings mobility. Unemployed job seekers who entered low paid jobs were likely to return to joblessness in the future. While higher levels of education were negatively associated with the probability of individuals being in low paid employment, if a person ended up in low paid employment then education and recent experiences of training did not influence the transitions from low paid employment.

Marks *et al.* (2003) found similar evidence among young Australians that those who experience a long spell of unemployment were less likely to be employed full-time in the future and more likely to spend more time unemployed or in ‘marginal’ activities – out of the labour force, part-time study or part-time work.

Late career qualifications and shorter interruptions to study

In general, the literature that estimates education effects tends not to incorporate the age when individuals undertake their post-school education and training – specifically whether the study occurs immediately or soon after they complete school. An exception is Jenkins, Vignoles, Wolf and Galindo-Rueda (2002), who found that workers without previous post-school qualifications who subsequently completed one between the age of 33 and 42 in the United Kingdom received increased hourly wages compared to those who did not upgrade their skills. Those with previous post-school qualifications who completed additional qualifications appeared to receive little benefit in terms of their wages, however. All qualifications completed between the age of 33 and 42 increased the probability individuals were employed, including among males and females who were not employed at age 33 (confirmed for females in Jenkins 2004). These qualifications also increased the likelihood women remained employed.

Evidence for Australia was presented in Ryan (2001a) that indicated that the timing of individuals’ education does not affect the estimated qualification effects on wages. That is, individuals appear to enjoy the same increase in wages regardless of when in their careers they complete their qualifications in Australia. In another paper, Ryan (2001b) found that the effects of qualifications on full-time employment did vary according to when in individuals’ lives they completed their VET qualifications. Those males who completed their qualifications as mature-age students received a longer lasting full-time employment benefit compared to those without qualifications than those who completed their qualifications when they were young. For females, the relative benefits were greater for young VET qualification completers. In general, the full-time employment effects of VET qualifications were the same for very early school leavers as other completers.

There is a small, related international literature that looks at the incidence, duration and impact of shorter ‘interruptions’ to the schooling of young people. Typically, this literature on those who return to education does not distinguish between individuals who have completed the highest level of school or not. This literature includes Griliches (1980), Marcus (1984, 1986) and Light (1995, 1996). Work by the latter two authors suggests that in the United States between one quarter and one third of individuals interrupt their education. Often those individuals who return to education undertake quite short courses of education, however. Griliches (1980) found that interruptions to schooling had no negative effects on the subsequent wages of individuals. Using later data, Light (1995) found that individuals who interrupted their schooling did receive lower returns for it than those who completed it in a continuous fashion. Light was able to address the endogeneity of both the initial schooling choice and the endogeneity of the return to school decision in the wage equation she estimated.

There is one Australian study on this issue, Miller (1984). Miller used data on adult males from the Social Mobility in Australia Project. Miller found that there was no effect from interruptions to study on the subsequent wages of individuals. In Miller’s study, interruptions were defined as those that occurred when individuals pursued courses of full-time post-school study at least one year after they completed secondary school.

Impact of educational qualifications for the unemployed

General results

There is little Australian literature that compares the longer-term outcomes of individuals, especially early school leavers, who undertake an education and training course after a spell of unemployment – path F – with those unemployed who do not choose that course – path E. Ryan (2000) contains some relevant research in analysing the destinations of TAFE and university 1997 graduates in early 1998. Like others, he found that the nearly 30 percent post-course full-time employment rate among those who had been unemployed prior to undertaking their course was substantially below that of other TAFE graduates, many of whom were already employed before they commenced their course. A better comparison is obviously against the full-time employment rate of unemployed individuals who did not undertake a TAFE course. Ryan reported that these full-time employment rates were not much different than those of a group from the general Australian population just two years after they were first observed to be looking for work (which is about the same average time between TAFE course commencement and measurement of the employment outcomes).

However, other evidence presented in Ryan (2000) suggested the TAFE graduates who were unemployed before commencing the course might have been employed in higher skilled occupations than those employed full-time in the broader population. Of course, these were comparisons of the average outcomes of the previously unemployed TAFE graduates with the broader population of job seekers and ignored differences in the average characteristics of the two groups, which could potentially be very important. Obviously, it would be better to control for differences in the average characteristics of the groups in comparing the subsequent outcomes of the unemployed who choose to study with those who choose not to study, which is what is done in this study.

Post-program effects among the unemployed

Greenberg, Ashworth, Cebulla and Walker (2004) conducted a meta-analysis of United States mandatory welfare-to-work programs that involve random assignment of individuals to treatment and control groups in labour market programs. They contrasted 'work first' labour market programs with programs that emphasize human capital development. They found that 'work first' programs provided more immediate benefits to participants, and while these benefits diminished with time, the stream of benefits associated with 'work first' programs was substantially above that of human capital development programs. Note that the welfare-to-work programs were not themselves designated as 'work first' or human capital programs – rather the evaluators of the programs assigned them to those categories on the basis of the extent to which job search activities were emphasised by the programs. In a companion paper, the authors found that caseload characteristics and local environments can be equally important as or even more important than program design in the effects of these programs (Ashworth, Cebulla, Greenberg and Walker 2004). Unfortunately, program descriptions do not indicate exactly what the human capital development programs involved or their typical length or intensity, so it is difficult to assess how much 'human capital development' took place. Unlike this study, these programs did not involve completion of formal qualifications.

Hotz, Imbens and Klerman (2000) re-analysed one of the important programs whose evaluation was included in the meta-analysis of Greenberg *et al.* (2004). The re-analysis involved using the outcomes of subjects for nine years after program randomisation, and allowing for the estimated treatment effects to vary across individuals. Their work reinforces the view that human capital development programs had a more enduring effect than the work first programs, despite the relatively poor initial effects.

Further, the Greenburg *et al.* (2004) view is not the only possible interpretation of the findings of the evaluations of US programs involving random assignment to labour market programs. In summarising exactly the same set of studies, Heckman, LaLonde and Smith (1999) concluded that "the evidence suggests that programs that offer training can raise the earnings of economically disadvantaged adult males, but programs that focus on JSA (Job Search Assistance) or WE (Work Experience) appear to be ineffective or sometimes worse" (pages 2055 – 2056). Heckman *et al.* (1999) reported that the estimated effects were larger and more robust for adult women, but negligible for youths. Martin (2000) reviews the same literature and also emphasises the positive outcomes of training for some groups. Exactly how these two views of the impact of the US labour market programs involving random assignment might be reconciled is unclear.

Heckman *et al.* (1999) also summarised the extant literature evaluating European studies in their survey, noting: first that the emphasis in such studies tended to be on employment outcomes rather than earnings; second, few of the evaluations were based on experimental data; and third, that few of the studies used longitudinal data. Heckman *et al.* (1999) drew attention to the extensive administrative data available in Scandinavian countries. They concluded that the European studies tended to point towards positive program effects on employment, but that there was little evidence of earnings or hourly wage effects. More recent evaluations of programs paint no clearer picture of the relative merits of work first and human capital development labour market programs.

Riddell and Riddell (2005) exploit data from a randomised trial of Canadian welfare recipients to assess the impact of additional educational qualifications on the labour market outcomes of single parents. The randomised trial was designed to assess the effect of an intervention that encouraged single parents to find employment. Over the course of the trial, however, many individuals upgraded their educational qualifications, with the upgrading greatest among members of the trial control group. The authors interpreted this as suggesting that members of the control group were less time constrained, since they were less likely to be employed early in the trial than were members of the intervention group. Riddell and Riddell (2005) found that those single parents who upgraded their education achieved larger gains in employment and wages than did those who did not upgrade their education and were also less likely to remain on welfare. The authors concluded that at least the employment and wage effects were the outcome of the educational upgrading and did not reflect differences in unobservable characteristics between the group who upgraded and those who did not.

For Australia, Stromback and Dockery (2002) analysed the impact of participation in different types of labour market programs on the transitions of individuals out of unemployment. They found that those with higher levels of education leave periods of unemployment for employment faster than those with lower levels, across four types of labour market programs operating in the mid-1990s: wage subsidies; training programs; brokered employment arrangements; and job search assistance. Conversely, those with longer histories of job search (more unemployment) moved into employment more slowly than those with shorter histories.

Other studies have assessed the impact of labour market programs on the outcomes of individuals, sometimes utilising information on the education level of subjects. Dockery (2002) used departmental administrative data to evaluate the New Enterprise Incentive Scheme, a self-employment program, and found that those with higher levels of education were more likely to be employed and off benefits after the scheme. Saunders and Brown (2004) analysed movements off welfare in Australia with data from the General Customer Survey administered by the Department of Family and Community Services. Their results point to some positive effects in promoting movement off welfare from possession of a degree and negative effects from not having completed any post-school qualifications, but the sample sizes in the data were small.

A related literature looks at the subsequent experiences of retrenched workers and aims to estimate the impact of individuals' responses to their situation on their later outcomes. For example, Webber and Weller (2002) report on what happened to individuals who were retrenched from TCF industries from the late 1980s in Australia. The Labour Adjustment Package implemented for such workers provided opportunities for them to undergo retraining. Webber and Weller (2002) found that those who undertook retraining had better later employment outcomes than those who did not, though the exact contribution of this retraining to those better outcomes was unclear.

Implications of the literature review for this study

The existing literature points to several matters that need to be reflected in the analysis undertaken in this study. The first is to note that average qualification effects estimated over the entire population may not be representative of those for specific groups, especially for low ability groups. Potential interactions between qualifications and ability need to be checked. Second, the estimation should proceed with as complete a set of

background characteristics of subjects as possible, to limit problems caused by factors not included in the regression equation. Third, the literature on the timing of qualification completion and its impact on outcomes is in its infancy and presently not yet conclusive. Fourth, longitudinal data provides the opportunity to estimate the effects of new qualifications completed during the data collection period on individual outcomes. The role of such additional education in ‘breaking the cycle’ of disadvantage for the intermittently unemployed is unclear, but potentially may be important.

One should not read too much into evaluations of labour market programs in other countries for their relevance to Australia. In addition to differences in important institutional features, such as the income support conditions, the content of the designated human capital development or training programs is often unclear, so it seems important to analyse the impact of something with a relatively clear meaning. Consequently, in this study, we analyse the impact of completed education and training ‘qualifications’.

4. METHODOLOGY AND DATA

Methodology

As set out in the introduction, the purpose of this paper is to address two research questions. The first is what impact post-school qualifications have on the labour market outcomes achieved by early school leavers a few years after completing the qualifications. The second is what is the impact of later qualifications on those early school leavers who experienced a substantial period of unemployment.

In this paper, these questions are addressed through the regression approach sketched in this section, but describe more fully and formally in Appendix 1. These regression equations are used to identify the set of ‘explanatory’ variables that determine the observed labour market and study outcomes of individuals set out in Table 1. The set of explanatory variables include personal and demographic characteristics of individuals (described below and defined in Appendix 2) and variables that capture their level of completed education. In this paper, these education variables include the level (grade) of schooling completed by individuals and whether they completed post-school education and training qualifications. Regression analysis allows estimation of the separate effects of these education and training qualifications, taking into account the other characteristics of individuals.

The two issues of interest for the first research question of this paper are whether the average difference in the outcome variables associated with post-school qualifications, conditional on background and labour market variables is: first, positive; and second, the same for early school leavers as for individuals who completed Year 12. This requires estimation of the qualification effects for both early school leavers and those who completed Year 12 and the conduct of tests for significant differences in the estimated qualification parameters.

The issue of interest for the second research question of this paper involves analysis of whether the average difference in the outcome variables associated with post-school qualifications among early school leavers is the same whether or not they have experienced a substantial period of unemployment. This requires estimation of the qualification effects separately for early school leavers who do and do not experience a substantial period of unemployment and tests for differences in the estimated effects.

The outcomes of individuals analysed capture whether individuals have a full-time or part-time job or no job and whether they are studying; and their weekly wages if they are employed. These outcomes are measured at a common point of individuals’ lives. The first variable involves five discrete possibilities, the second is a continuous variable. Regression techniques appropriate for each dependent variable are used: multinomial logit for the employment/ education outcomes; and least squares for wages.

As foreshadowed in Section 2, one issue for estimation is that the education choices individuals make – such as level of school completed and participation in post-school education –are likely to be related to unobserved factors, such as innate ability, that also influence their later outcomes. This causes problems for the reliability of the regression parameters. In estimation of the regression equations, these variables are treated as exogenous, while attempts to deal with this unobserved heterogeneity problem are discussed later in the paper.

Data used in this study

This project uses data from two Longitudinal Surveys of Australian Youth (LSAY) cohorts to estimate the magnitude of education and training qualification effects for early school leavers. These cohorts are the Youth in Transition 1975 birth cohort (YIT 75) and the Longitudinal Surveys of Australian Youth 1995 Year 9 cohort (LSAY 95).

The YIT 75 cohort was an age-based cohort. When first surveyed in October 1989, the respondents were aged 14 years. The actual grades students were in across Australia when surveyed in 1989 reflected differences in the structure of the schooling systems, school commencement procedures across Australian jurisdictions and the timing of the survey (or at least, the reference date for age in the survey of the beginning of October). The entry into the labour market of early school leavers from this cohort coincided with the recession of the early 1990s in Australia.

The LSAY 95 cohort was a grade-based panel. Students were in Year 9 in 1995, but were different ages, again depending on differences in the structure of the schooling systems, school commencement procedures across Australian jurisdictions and the timing of the survey (or at least, the reference date for age in the survey of the beginning of October). Early school leavers from this cohort entered a stronger general labour market than those from the earlier cohort.

Both cohorts were drawn from two-stage cluster samples of Australian school children. In the first stage, schools were randomly selected. In the second stage, students from those schools were randomly selected. In the first cohort, individual 14-year-old students were randomly selected; in the second cohort intact classes were randomly selected. The samples were stratified by school sector (government, Catholic or independent private schools). In both surveys, students completed literacy and numeracy tests at their schools, along with a short questionnaire to elicit background information. Participants were surveyed in subsequent years by mail and/or telephone questionnaires.

The outcomes of individuals in this study are measured eight years after they were first observed to be in Year 9 at school. For the LSAY 95 cohort, this means their outcomes are measured in 2003. For the YIT 75 cohort, this means that their outcomes are measured in 1996, 1997, 1998 and 1999, depending on whether they were in Years 10, 9, 8 or 7 respectively when first surveyed in 1989. This places individuals at a common point in terms of the time span of years within which they had an opportunity to undertake their education.⁴ The median age of the Y95 cohort in 2003 was 22 years, while the age of the YIT75 participants at their end point for this study varied from 21 to 24 years.

The data are drawn from two surveys for two reasons. The first is to ensure there are enough observations of individuals who left school early and completed post-school qualifications with and without experiences of substantial unemployment. The second reason is to ensure our results are not dependent on any unique conditions, notably labour market conditions, faced by a specific cohort of young people. Using data from two cohorts allows the impact of the labour market conditions that any specific set of early school leavers faced to be distinguished from the effects of early school leaving *per se*.

Table 2 contains the proportions of individuals by gender who were employed full-time, employed part-time or not employed. It provides these proportions for both cohorts.

Finally it contains some ‘benchmarks’ for comparison from the Australian Bureau of Statistics Labour Force survey for 22 year olds in February 2003.

The proportion of males employed full-time is greater than that of females by more than 10 percentage points in both the data used here and the ABS data (not shown), with the proportion of females employed part-time higher than that of males. The proportion employed full-time is similar in both cohorts used here, but more people were employed part-time in the second cohort than the first.

Full-time employment rates are about the same in the longitudinal data and the ABS Labour Force data, but the non-employment and part-time rates diverge between the two sources. While part of this may reflect some non-representativeness in the longitudinal data, it is possible that seasonal factors also make some contribution. The survey data were collected late in the year, rather than in February.⁵ On balance, and taking seasonal factors into account, the proportions in the longitudinal data appear close enough to the ABS ‘benchmarks’ to suggest the data might reflect the experiences of young Australians in general.

Table 2: Percentage of sample in employment at age 22, including comparison with similar ABS data.

Participation proportions	% (rows add up to 100%)		
	Not employed	Employed Part-time	Employed Full-time
Longitudinal data			
Females	19.3	29.9	50.8
Males	16.5	21.2	62.3
Persons	17.9	25.7	56.3
YIT75 cohort	23.6	20.9	55.4
LSAY95 cohort	15.6	27.7	56.7
ABS Labour Force data (22 year olds, Feb 2003)			
Persons	25.2	19.0	55.8

The use of data from two surveys does not appear to present any problems in the comparability of the background characteristics of individuals. When a probit equation was estimated to see if it was possible to explain which cohort observations came from, none of the individual background characteristics were significantly different from zero at the 5 per cent level.⁶

Important aspects of the composition of the data utilised here are presented by cohort in Table 3, along with the total number of observations. In total, just over 7400 observations are used in the analysis that follows. Attrition from the cohorts is substantial – the number of observations used represents 40 per cent of the original cohorts. Sample statistics reported in the paper are based on weighted data, where the weights are designed to deal with panel attrition, while the regression equations are estimated with unweighted data.⁷

Completion of Year 12 was substantially greater in the second cohort than the first. Members of the second cohort completed their schooling in the late 1990s and members of the first from the early to mid-1990s. The pattern of school completion in Table 3 departs from the ABS apparent retention rate estimates and those published in ACER-sourced work. Problems with ABS retention estimates in the early 1990s and the role of the weights used in ACER-sourced work and why they depart from the weights used here are discussed in Ryan and Watson (2004).⁸

Table 3: Schooling, qualification and unemployment experience composition of the sample^(a)

<u>Distribution across grade completed</u>		
Level of school completed	YIT 75	LSAY 95
	(per cent)	
Year 9	3.5	1.3
Year 10	13.5	10.1
Year 11	13.4	7.6
Year 12	69.6	81.0
<u>Post-school study participation</u>		
Never studied post school	16.1	12.7
Studied, incomplete and not still studying	29.9	14.8
Incomplete, but still studying	13.1	14.2
Completed a VET-- level qualification ^(b)	24.4	35.5
Diploma	4.7	9.4
Certificate	10.2	12.0
Apprenticeship	9.3	13.7
Traineeship	2.7	9.6
Other	4.2	1.0
Completed a degree	16.4	22.8
<u>Experience of unemployment</u>		
Ever unemployed six months or longer	18.6	19.9
Total number of observations	2177	5230

Notes: (a) All proportions use weighted data. (b) VET qualifications do not add to VET total, because individuals may have reported completing more than one qualification.

Participation and completion of post-school studies are also more prevalent in the second cohort than the first. Almost 90 per cent of the second cohort commenced some type of post-school study, slightly higher than in the first cohort. Completion rates seem substantially higher in the second cohort than the first – of those who commenced a qualification and who were not still studying when last surveyed, 80 per cent reported they had completed a qualification in the second cohort compared with 57 per cent in the first cohort. This may, in part, reflect differences in the survey methodology. Subjects in the second cohort were asked each year whether they had completed a qualification since their last interview, while those in the first cohort were asked only intermittently about the post-school qualifications they had completed. The impact of these differences on the results is discussed further below.

The proportion of individuals who had experienced a spell of unemployment of six continuous months or longer after leaving school was quite similar between the two

cohorts, at just under 20 per cent of subjects. The timing of this unemployment experience *vis-à-vis* participation in post school studies is important for this paper. Table 4 contains the number of cases in the two cohorts according to whether:

- they completed Year 12
- they experienced a period of unemployment of six or more months after leaving school;
- they commenced post-school study (not whether they completed the course)
- the timing of that study *vis-à-vis* any period of unemployment of six months or longer.

The numbers of observations of individuals who left school without completing Year 12 and experienced a period of unemployment of six months or longer and who either never studied or studied after their period of unemployment are quite small (118 and 176, respectively in the weighted data), so the necessity of pooling the samples to generate sufficient observations is clear.

Observed outcomes in the data associated with different schooling and qualifications attained

Simple individual outcome measures for the same variables used in Table 3 are reported in Table 5, and those that match the categories used in Table 4 appear in Table 6.

Employment rates were better among those who completed higher levels of schooling, who have completed post-school qualifications and who have never had a spell of unemployment as long as six months. Many individuals are still to complete their first post-school qualification, especially those who completed Year 12. Therefore, the full-time employment rates among current students are lower than for others, but part-time rates are substantially higher. Weekly net wages tend to be higher among those who have completed qualifications, though the effect of full-time labour market experience, necessarily lower among those with qualifications who studied full-time, potentially obscures part of the qualification effect on wages. Differential rates of part-time employment across the groups also affect these wage comparisons. Wages were lower for those who had a spell of unemployment for six months or more.

Broadly similar patterns are apparent in Table 6. Table 6 provides information about the outcomes associated with the timing of study and unemployment spells and their impact on the outcomes of individuals. Among those who had a spell of unemployment for six months or more, those who at least commenced a course of study tended to have better outcomes than those who never studied. Further, those who studied after their spell of unemployment had better outcomes than those who studied before their spell of unemployment.

Table 7 contains the proportions of individuals in the outcome categories we will analyse in our regression analysis, those identified previously in Table 1. These proportions are shown according to whether individuals completed Year 12 or not; whether they have completed VET-level qualifications or degrees or not; and whether they ever experienced a spell of unemployment of six months or longer after they left school. For those with VET qualifications, the timing of that spell of unemployment, either prior to or after they completed their VET qualification, is also taken into account.

Focussing simply on the last column, there are very large differences in the proportion employed full-time across the groups. Among those who did not complete Year 12, those with VET qualifications and who never experienced a substantial spell of unemployment had much higher full-time employment rates than any other group. Among those who did experience a spell of unemployment, those who subsequently completed a VET qualification had higher full-time employment rates than those who either never completed a VET qualification or experienced their spell of unemployment after the qualification.

Since many of the group who completed Year 12 were still studying towards their first post-school qualification, full-time employment rates were lower for this group at this point in their careers than the group who left school earlier. The same hierarchy of full-time employment rates is evident in the data for those with VET qualifications and Year 12 as those without Year 12. The costs of unemployment for the full-time employment outcomes of those with Year 12 and no post-school qualifications appear slightly lower than for the group who did not complete Year 12, but this may also be partly an artefact of the larger incomplete study status of many of those without a post-school qualification among the group who completed Year 12.

These tables of outcomes point to potentially positive qualification effects for individuals. However, those with post-school qualifications may also have other better characteristics that affect outcomes than those without. Hence, it is the regression analysis that appears in the next Section that provides a better indication of the presence and magnitudes of qualification effects on outcomes for individuals.

Table 4: Sample sizes for analysis

	Unweighted data			Weighted data					
	Number of observations			Number of observations			Shares of Total		
	YIT 75	LSAY 95	Total	YIT 75	LSAY 95	Total	YIT 75	LSAY 95	Total
<i>Did not complete Year 12</i>									
Never Unemployed 6 months or more, never studied post-school	93	111	204	129	144	272	5.9	2.8	3.7
Unemployed 6 months or more, never studied post-school	39	52	91	47	71	118	2.2	1.4	1.6
Unemployed 6 months or more, studied post-school before unemployment	26	76	102	36	96	132	1.6	1.9	1.8
Unemployed 6 months or more, studied after unemployment	52	88	140	77	100	176	3.5	1.9	2.4
Never unemployed 6 months or more, studied post-school	277	511	788	357	581	939	16.4	11.2	12.7
Total Did not complete Year 12	487	838	1325	645	993	1638	29.7	19.1	22.2
<i>Completed Year 12</i>									
Never Unemployed 6 months or more, never studied post-school	117	278	395	119	288	406	5.5	5.5	5.5
Unemployed 6 months or more, never studied post-school	40	94	134	55	100	155	2.5	1.9	2.1
Unemployed 6 months or more, studied post-school before unemployment	111	250	361	87	257	344	4.0	4.9	4.7
Unemployed 6 months or more, studied after unemployment	148	462	610	131	442	573	6.0	8.5	7.8
Never unemployed 6 months or more, studied post-school	1274	3308	4582	1137	3123	4260	52.3	60.0	57.8
Total Completed Year 12	1690	4392	6082	1529	4209	5738	70.3	80.9	77.8
Total	2177	5230	7407	2174	5201	7376	100.0	100.0	100.0

Table 5: Summary of key outcome measures for the sample at around age 22, according to schooling, qualifications and unemployment experience^(a)

<u>Distribution across grade completed</u>	Employed	Employed	Wages	Studying
Level of school completed	Full-time		(\$)	(per cent)
	(per cent)			
Year 9	72.5	62.4	527	4.3
Year 10	77.0	63.1	569	6.8
Year 11	75.9	58.7	607	10.6
Year 12	83.8	54.9	569	26.9
<u>Post-school study participation</u>				
Never studied post school	73.2	58.8	572	0.0
Studied, incomplete and not still studying	80.0	63.5	575	0.0
Incomplete, but still studying	77.1	26.1	457	100.0
Completed a VET- level qualification	87.0	62.8	576	17.5
Diploma	87.7	56.7	538	19.3
Certificate	85.5	54.9	513	19.0
Apprenticeship	88.3	72.4	639	12.8
Traineeship	90.6	72.3	646	11.8
Other	82.9	64.1	558	16.9
Completed a degree	85.5	58.9	621	12.9
Total	82.1	56.3	571	22.2
<u>Experience of unemployment</u>				
Ever unemployed six months or longer	71.0	45.6	532	20.1
Never unemployed six months or longer	84.8	59.1	578	22.8

Notes: (a) All estimates are based on weighted data.

Table 6: Summary of key outcome measures^(a) for the sample at about age 22, by whether completed Year 12, attainment of post school qualifications and experience of unemployment

	Employed (per cent)	Employed Full-time (per cent)	Wages (\$)	Studying (per cent)
<i>Did not complete Year 12</i>				
Never Unemployed 6 months or more, never studied post-school	75.8	64.0	566	0.0
Unemployed 6 months or more, never studied post-school	36.5	21.5	390	0.0
Unemployed 6 months or more, studied post-school before unemployment	62.4	36.8	400	15.4
Unemployed 6 months or more, studied after unemployment	71.8	53.5	476	16.5
Never unemployed 6 months or more, studied post-school	83.9	67.6	507	10.5
Total Did not complete Year 12	76.1	59.6	496	9.0
<i>Completed Year 12</i>				
Never Unemployed 6 months or more, never studied post-school	85.8	68.7	495	0.0
Unemployed 6 months or more, never studied post-school	59.5	49.6	477	0.0
Unemployed 6 months or more, studied post-school before unemployment	69.9	37.1	381	30.4
Unemployed 6 months or more, studied after unemployment	80.6	52.3	412	25.2
Never unemployed 6 months or more, studied post-school	86.0	56.2	444	30.0
Total Completed Year 12	83.8	55.4	441	26.6
Total for the sample	82.1	56.3	454	22.7

Notes: (a) All estimates are based on weighted data. The outcomes are shown for those who commenced post-school qualifications, but need not have completed them.

Table 7: Percentage of the sample at about age 22 in 5 mutually exclusive education and employment categories, by whether completed Year 12, attainment of post school qualifications and experience of unemployment^(a)

Effects on participation probabilities	% (rows sum to 100%)				
	Not studying or employed	Studying not employed	Studying employed part-time	Not studying and Employed part-time	Employed full-time
<u>School leavers without Year 12</u>					
Never Unemployed 6 months or more, never studied post-school	24.2	1.0	3.5	9.3	61.9
Unemployed 6 months or more, never studied post-school	45.5	2.4	1.5	15.6	35.1
<i>VET qualification</i>	14.2	1.3	2.4	13.6	68.4
Unemployed 6 months or more, studied before unemployment	31.9	4.4	3.0	22.7	38.0
Unemployed 6 months or more, studied after unemployment	24.5	0.7	1.6	17.9	55.3
Never unemployed for 6 months or longer	9.8	0.8	2.4	11.8	75.2
<u>School leavers with Year 12</u>					
Never Unemployed 6 months or more, never studied post-school	9.0	8.8	21.3	10.8	50.1
Unemployed 6 months or more, never studied post-school	21.9	8.7	12.9	10.9	45.6
<i>VET qualification</i>	7.9	3.9	10.4	17.5	60.2
Unemployed 6 months or more, studied before unemployment	18.6	6.3	12.3	28.1	34.8
Unemployed 6 months or more, studied after unemployment	11.5	5.3	5.7	21.1	56.4
Never unemployed for 6 months or longer	6.0	2.9	9.9	16.0	65.2
<i>University degree</i>	10.1	4.4	5.9	20.5	59.1

Notes: (a) All estimates are based on weighted data. Unlike Table 6, where outcomes are shown for those who commenced post-school qualifications, the observed proportions in this table are shown for those who have completed post-school qualifications.

5. REGRESSION RESULTS

This Section contains the results from the regression analysis of the outcomes of individuals in their early twenties. The results described first are from the analysis of the activities in which individuals are engaged, followed by a brief summary of the wage equation results.

Reporting the results from the labour market outcomes equation

Multinomial logit estimation is used to calculate the effect of variables of interest on whether individuals at around age 22 are employed full-time, employed part-time or not employed, in combination with their participation in study. These five mutually exclusive combinations were set out in Table 1. The parameters of multinomial logit equations are quite difficult to interpret because the logit function is non-linear. Therefore, the impact of any variable like additional VET qualifications on the outcome probabilities depends on the other characteristics of individuals and the other estimated parameters. For this reason, the estimated impacts of variables on the probabilities that a typical individual will be in any of those five categories are presented in this paper. These probabilities are summarised in Tables 8, 9, 10 and 11 with the detailed regression parameters for one typical specification presented in Appendix Table 3.1. Table 8 contains the estimated effects of the educational qualification variables, Table 9 summarises the results for males and females separately, Table 10 incorporates the effect of spells of unemployment and Table 11 contains the estimated effects of other variables of interest. The *p-values* in the last or next to last columns of the tables show the joint significance of the specific qualification variables in generating a different distribution across the five outcome categories than that apparent for the control individual (someone who left school prior to completing Year 12).

In all equations, the qualification variables were supplemented by a set of other explanatory variables. Since the focus of the research is on the qualification effects, these other variables and their effects on the outcomes are not discussed in detail. The variables are described in Appendix 2. The non-education variables included in the equation were: state variables; gender; type of school attended; language background; a metropolitan identifier; parental socio-economic status; individual school achievement in mid-secondary school; self-assessed school performance relative to peers; and the unemployment rate in the individual's state in their early twenties. The estimated probabilities that appear in Table 8 through to Table 11 use the actual values of these non-education variables for all individuals in the data to estimate the with and without-qualification probabilities for each individual in the sample. These probabilities are then averaged across all individuals in the sample.

The estimated effects of the completion of qualifications on the outcomes of individual can be calculated by comparing the probabilities in the rows for individuals with qualifications with the rows of otherwise comparable states (eg with Year 12 and with/without a spell of unemployment) without qualifications. Given the way these probabilities were calculated, these estimated qualification effects are estimates of the 'average treatment effect' of the relevant qualifications. That is, it is an estimate of the expected impact of a qualification on the outcomes of someone drawn randomly from the population of young people. The reported effect is equal to the estimated impact averaged across all individuals in the sample. Other parameters of interest from the

evaluation literature include the effect of a ‘treatment on the treated’ – that is, by how much did those who actually completed the qualification benefit from having done so; and ‘treatment on the untreated’ – that is, by how much would those who have not undertaken the qualification have benefited had they done so. These estimated effects are not reported explicitly below, but are summarised in the discussion (Cobb-Clark and Crossley 2003 discuss these effects).⁹

The estimates in Tables 8 to 11 do not all come from the same regression equation. Rather, they represent five variations in the way the VET level qualifications were specified – sometimes in quite an aggregated way, sometime in a disaggregated way. The five variations are denoted by *I*, *II*, *III*, *IV* and *V* respectively in the Tables.

- Specification *I* involves the aggregation of all VET qualifications so that there is one common VET effect on outcomes;
- specification *II* allows the VET effect to vary between those who did or did not complete Year 12;
- specification *III* splits the VET qualifications into their ‘types’ – diplomas, certificates, apprenticeships, traineeships and others;
- specification *IV* (Table 10 only) allows the effects of qualifications to vary depending on the unemployment experience of VET graduates; and
- specification *V* (Table 11 only) allows the impact of the VET qualifications to vary with the time since graduates completed their qualification.

General effects of qualifications on labour market outcomes

The first line of Table 8 contains the predicted distribution of individuals across the five outcome categories from the regression parameters. It is very close to the observed proportions in the data reported in the second line. The remaining entries in Table 8 show how the estimated probabilities change with completed education. From the third line, those who did not complete Year 12 or any post-school qualifications had about average employment outcomes, but were much less likely to be studying than Year 12 completers. Consequently, over one fifth were neither studying nor employed.

From Table 8, individuals who completed a VET-level qualification had higher full-time and part-time employment outcomes than other school leavers who had no such qualifications. Those who completed VET qualifications but not Year 12 had better employment outcomes than their contemporaries who did not complete school – those who completed VET qualifications and Year 12 had better full-time employment outcomes than those who completed Year 12 only. These effects were numerically smaller for those who did not complete the highest level of school (10.9 percentage points) than those who completed Year 12 (12.7 percentage points), however the difference was not statistically significant.¹⁰

Table 8: Estimated probabilities (b) for a typical individual in the sample of being in one of 5 mutually exclusive labour market states at about age 22, by level of schooling and qualification completed (per cent)

Effects on participation probabilities	Probability					<i>p-value</i>	Specification
	Not studying or employed	Studying not employed	Studying employed part-time	Employed part-time	Employed full-time		
Average predicted probability	12.2	5.3	11.2	14.8	56.5		<i>I</i>
Observed proportions	12.8	5.1	11.0	14.7	56.3		
<u>Did not complete Year 12</u>							
No post-school qualifications	22.2	2.4	6.6	12.1	56.7		<i>I</i>
With VET qualifications							
Common VET effect	13.3	1.1	4.1	14.0	67.6	0.000 ^(a)	<i>I</i>
VET effect for non-completers of Year 12	13.6	1.6	5.6	12.8	66.4	0.002 ^(a)	<i>II</i>
With specific VET qualifications							
Diploma	20.4	1.4	5.4	16.7	56.1	0.000 ^(a)	<i>III</i>
Certificate	15.0	1.6	6.0	17.3	60.1	0.000 ^(a)	<i>III</i>
Apprenticeship	13.5	1.7	3.3	12.1	69.4	0.000 ^(a)	<i>III</i>
Traineeship	13.1	0.7	3.6	11.9	70.8	0.000 ^(a)	<i>III</i>
Other	18.6	1.1	4.4	11.7	64.2	0.054 ^(a)	<i>III</i>
<u>Completed Year 12</u>							
No post-school qualifications	11.8	8.6	18.3	12.3	49.0	0.000 ^(a)	<i>I</i>
With VET qualifications							
Common VET effect	7.3	4.4	12.2	14.8	61.3	0.000 ^(a)	<i>I</i>
VET effect for Year 12 completers	7.2	4.2	11.7	15.1	61.7	0.000 ^(a)	<i>II</i>
With University qualifications	12.9	3.2	4.2	20.5	59.2	0.000 ^(a)	<i>I</i>

Notes: (a) Test that parameters on the variable for other categories relative to the ‘not studying or employed’ group are jointly zero. (b) These estimates are based on regressions reported in Appendix 3.

This result provides a partial answer to the first research question. At least in terms of employment, notably full-time employment, VET-level qualification effects are not statistically smaller for those who did not complete the highest level of school than for those who did.

Among the VET qualifications, the largest full-time employment rates are associated with completion of apprenticeships and traineeships – two clearly vocationally-focused qualifications. Graduates of all but Diploma courses had higher full-time employment outcomes than those of individuals without post-school qualifications who did not complete Year 12.

VET graduates had smaller rates of participation in study than these other groups, however. Those who completed VET qualifications but not Year 12 had lower study participation rates than their contemporaries who did not complete school – and those who had completed VET qualifications and Year 12 had lower rates than those who had completed Year 12 only. The study participation rates for both groups with Year 12 were substantially above the rates among those who had not completed Year 12.

The full-time employment outcomes for those with university qualifications are higher than those with Year 12 and no post school qualifications, but not much different from those without Year 12 and with no post-school qualifications and the Year 12 group with VET qualifications. Slightly more of the university graduates worked part-time, but fewer of them were engaged in study after completion of their degrees. This may be because university graduates in the sample would have just completed their qualification and had little time to establish themselves in the labour market.

Qualification effects for males and females

Table 9 contains an equivalent specification to specification *I* in Table 8, except the equation was estimated separately for males and females. The higher full-time employment rates of males and higher part-time employment rates of females are reflected in the Table. These differences are apparent across all comparisons of individuals completing similar educational levels.

Once this point is noted, however, all of the points already made for ‘persons’ carry over for both males and females. VET graduates have higher full-time employment rates than those without VET qualifications, and this holds for both Year 12 completers and non-completers. Once more, the effect is marginally higher for those with Year 12 than for those who did not complete Year 12. University graduates have higher full-time employment rates than Year 12 completers with no post school qualifications.

One point of difference is that male VET graduates tend to have higher full-time employment rates than university graduates, while full-time employment rates of female VET graduates are on a par with female university graduates. Nevertheless, the better full-time employment rates of female VET graduates over those without post-school qualifications remain. In these data, in terms of full-time employment rates, the benefits provided by VET qualifications do not appear to differ between males and females.

VET-qualification effects among those with an experience of unemployment

The impact of a spell of unemployment of six months or longer on the outcomes of individuals is shown in the top two rows of Table 10. Prior experience of unemployment lowers the probability individuals were employed full-time in their early-twenties by just in excess of 16 percentage points and increases the likelihood of being neither working nor studying by the same amount. The probability of working full-time was only just above that of neither working nor studying for the group with the experience of unemployment.

Table 9: Estimated probabilities(b) for typical males and females in the sample of being in one of 5 mutually exclusive labour market states at about age 22, by level of schooling and qualification completed (per cent)

Effects on participation probabilities	Probability					<i>p-value</i>	Specification
	Not studying or employed	Studying not employed	Studying employed part-time	Employed part-time	Employed full-time		
Females							
<u>Did not complete Year 12</u>							
No post-school qualifications	26.9	2.1	7.9	17.3	45.8		<i>I</i>
With VET qualifications							
Common VET effect	17.5	1.2	4.7	20.7	55.9	0.000 ^(a)	<i>I</i>
<u>Completed Year 12</u>							
No post-school qualifications	13.1	7.7	20.7	14.6	43.9	0.000 ^(a)	<i>I</i>
With VET qualifications							
Common VET effect	8.7	4.4	13.3	18.0	55.6	0.000 ^(a)	<i>I</i>
With University qualifications	12.4	2.7	4.8	23.7	56.4	0.000 ^(a)	<i>I</i>
Males							
<u>Did not complete Year 12</u>							
No post-school qualifications	17.3	2.8	5.5	6.9	67.6		<i>I</i>
With VET qualifications							
Common VET effect	9.0	1.1	3.5	7.5	78.9	0.000 ^(a)	<i>I</i>
<u>Completed Year 12</u>							
No post-school qualifications	10.5	9.5	15.6	9.5	55.0	0.000 ^(a)	<i>I</i>
With VET qualifications							
Common VET effect	5.7	4.3	10.9	11.1	68.0	0.000 ^(a)	<i>I</i>
With University qualifications	23.0	0.9	1.0	11.3	63.8	0.000 ^(a)	<i>I</i>

Notes: (a) Test that parameters on the variable for other categories relative to the 'not studying or employed' group are jointly zero.

Table 10: Estimated probabilities(b) for a typical individual in the sample of being in one of 5 mutually exclusive labour market states at about age 22, by level of schooling, VET qualification and experience of unemployment (per cent)

Effects on participation probabilities	Probability					<i>p-value</i>
	Not studying or employed	Studying not employed	Studying employed part-time	Employed part-time	Employed full-time	
<u>Experience of unemployment^(b)</u>						
Never unemployed for 6 months or longer	22.2	2.4	6.6	12.1	56.7	
Unemployed for 6 months or longer	38.5	3.1	5.0	13.1	40.3	0.000 ^(a)
<u>Did not complete Year 12^(c)</u>						
<i>Never Unemployed 6 months or more</i>						
Without post-school qualifications	22.5	2.4	6.4	11.5	57.1	
With a post-school VET qualification	12.9	0.8	4.1	12.5	69.7	0.000 ^(a)
<i>Unemployed 6 months or more</i>						
Without post-school qualifications	37.8	2.5	5.2	11.1	43.4	
Post-school VET qualification completed before unemployment	31.6	2.8	3.5	23.9	38.2	0.001 ^(a)
Post-school VET qualification completed after unemployment	22.4	2.3	2.9	15.7	56.7	0.000 ^(a)
<u>Completed Year 12^(c)</u>						
<i>Never Unemployed 6 months or more</i>						
Without post-school qualifications	12.2	8.7	17.7	11.9	49.5	
With a post-school VET qualification	7.2	3.2	12.5	13.5	63.6	0.000 ^(a)
<i>Unemployed 6 months or more</i>						
Without post-school qualifications	22.1	9.7	15.5	12.3	40.4	
Post-school VET qualification completed before unemployment	18.0	10.5	10.6	26.0	34.9	0.001 ^(a)
Post-school VET qualification completed after unemployment	12.7	9.0	8.9	17.2	52.2	0.000 ^(a)

Notes: (a) Test that parameters on the variable for other categories relative to the 'not studying or employed' group are jointly zero. (b) Based on specification I. (c) (b) Based on specification IV.

The next set of results show the estimated impact of VET qualifications for school leavers who did not complete Year 12, where the impact is allowed to vary according to whether individuals had: a spell of six months unemployment after completing their qualification; a spell of six months unemployment prior to completing their qualification; or no spell of unemployment of six months or longer. Specification *IV* allows experiences of unemployment to affect the impact of VET qualifications for all individuals,¹¹ whether or not they completed Year 12 (earlier results indicated that there were no statistically significant differences in the VET qualification effects between the two groups).¹²

The estimated probabilities from specification *IV* are quite close to the observed proportions in the data reported in Table 7, with one exception. The estimated full-time employment probabilities for the group with VET qualifications who never experience a spell of unemployment are somewhat lower than the observed rates – this group must have other characteristics that increase their probability of obtaining full-time employment, even without their qualification. The estimated full-time employment rates for the other VET groups are very similar to those actually observed in the data, which suggests that their other characteristics included in the regression equation are broadly comparable to other individuals in the sample.

The other estimated probabilities in Table 10 largely follow the patterns in the observed proportions in Table 7. Those with VET qualifications and no substantial experience of unemployment have the highest full-time employment rates, while those who were unemployed after studying have the lowest.

The probabilities for the group who studied after their spell of unemployment suggest that the full-time employment outcomes of those who experienced a spell of unemployment and subsequently completed a VET qualification had better full-time employment outcomes in their early twenties than those who experienced the spell of unemployment and did not complete further study. The difference of 13 percentage points in the full-time employment probabilities between these groups is similar in magnitude to that between the group with VET qualifications and no experience of unemployment and the group without qualifications and no unemployment experience (the first row of Table 10).

Of further note about the estimated probabilities for the group who studied after their spell of unemployment is that their pattern across the outcomes broadly matches that of the group who completed no post-school qualifications and experienced no substantial spells of unemployment. That is, the effect of completing a VET qualification undoes the negative effect on outcomes of those who experienced a substantial spell of unemployment. This appears to be the case for VET graduates regardless of whether they completed Year 12 or not.

As noted earlier, the qualification effects in the Tables provide estimates of ‘average treatment effects’ as if the entire population completed the relevant qualification. The other main measure of impact estimated in the evaluation literature is the effect of the ‘treatment on the treated’, while another important one in the context of considering whether others should be encouraged to undertake a course of action is ‘treatment on the untreated’. The first provides an estimate of the benefit of completing the qualification by those who actually did so; the second of the potential benefit to those who did not. The

first impact measure involves a comparison of the with- and without-qualification estimated probabilities for the group who completed it; the second of the with- and without-qualification estimated probabilities for the group who did not complete it. In these data, the treatment on the treated and treatment on the untreated effects are very similar to the average treatment effects reported in Table 10.¹³

Other results and refinements to the regression equations

Other results and variations in the specification

Other aspects of the regression results are shown in Table 11. These involve the estimated effects on the probabilities individuals are in specific outcome categories of some of the continuous variables. These variables are school achievement, measured in the middle of secondary school, the unemployment rate in the individual's State in the year the outcome was measured and their parental social background. The effects seem to make intuitive sense: individuals with higher achievement levels are more likely to be studying, as are those from higher social backgrounds and higher unemployment drives up joblessness (all supportive of previous research such as Marks, Fleming, Long, and McMillan 2000, and Marks and Fleming 1998b). A movement of 5 percentage points would increase the probability of joblessness by around 10 percentage points for an individual, a quite substantial effect, though it appears it would principally be at the expense of part-time employment.

Table 11 also summarises the results of one alternative specification of the model, where we allowed the qualification effects to vary with the time since individuals had completed them. This variation had a much larger impact on the estimated parameters and consequent probabilities for those with degrees than those with VET qualifications, so we have not focused on these results. They do suggest that the full-time employment rate of degree graduates grows very strongly with time since course completion, while the VET qualification effect on employment is more immediate (consistent with results in Ryan 2001b). Longer duration with VET qualifications is associated with increased participation in further study in these data. The qualification effects on the estimated full-time employment probabilities for this specification, akin to those in Tables 8 and 10, were slightly larger in the case of mean VET qualifications and smaller for university degrees.

Other specifications were also explored, including the inclusion of interaction terms between school achievement and VET and degree qualifications and refining estimation of the impact of 'early school leaving'. Inclusion of the interaction terms had no impact on the VET qualification effects and the interaction terms were not significant so those results are not reported. Those with poorer literacy and numeracy skills appear to gain as much from completion of a VET qualification as those with better skills.

Splitting those who did not complete Year 12 into smaller but more homogeneous groups of earlier school leavers has both costs and benefits. The costs are that there are no observations in some outcome cells used in the regression analysis – very early leavers are not observed studying, for example. It is possible to estimate the regression equation with an identifier for those who left in Year 11. The comparisons of the qualification effects could be made with those who left in Year 10 or earlier. However, the Year 11

variable was not significant at the 5 per cent level, suggesting that splitting that group off from other Year 12 non-completers added little to the analysis.¹⁴

In the description of the data provided above, it was noted that qualification completion rates appeared to be higher in the second cohort than the first, but that differences in the way these data were collected in the two surveys may have contributed to these measured differences. Essentially, qualification completion rates may be too low in the first cohort. To assess the potential impact of these differences on the results, the multinomial logit equation was estimated separately for the two cohorts and the differences in the estimated qualification effects tested to see whether they were significant. The estimated parameters were significantly different – the estimated effects of VET qualifications on full-time employment were lower in the first cohort than in the second. If the parameters for the first cohort are influenced more by measurement error than the second, then our joint estimates probably *understate* the effect of educational qualifications on the full-time employment outcomes of those who complete them.

Table 11: Summary of other important effects in the labour market outcome regressions

Effects on participation probabilities	Probability					<i>p-value</i>	
	Not studying or employed	Studying or not employed part-time	Employed part-time	Employed full-time			
<i>Percentage point change in the probability</i>							
Specification I. Marginal effect of a 1 standard deviation increase in school achievement	-1.6	1.6	3.2	-0.3	-3.0	0.000 ^(a)	
Specification I. Marginal effect of a 1 standard deviation increase in Parental SES	0.0	0.5	1.1	-0.5	-1.1	0.000 ^(a)	
Specification I. Marginal effect of a 1 % point increase in the current unemployment rate	2.1	0.5	-1.4	-1.3	0.0	0.000 ^(a)	
Specification V. Marginal effect of a 1 year increase in time since VET qualification completed	-0.3	0.6	2.3	-1.2	-1.3	0.000 ^(a)	
Specification V. Marginal effect of a 1 year increase in time since degree completed	-5.0	1.6	3.6	-6.5	6.3	0.000 ^(a)	

Notes: (a) Test that parameters on the variable for other categories relative to the ‘not studying or employed’ group are jointly zero.

Unobserved heterogeneity and the exogeneity of the qualification effects

As noted earlier, one concern about treating educational qualifications as exogenous variables in regression equations arises from concerns about unobserved heterogeneity. Essentially this means that unobserved differences between the types of individuals who undertake post-school qualifications and those who do not, that also affect the outcomes we are interested in, might cause us to attribute too much or too little to the role of the qualifications themselves. Such factors are typically taken to include: unobserved innate ability; preferences or tastes for education; motivation and attitudes, including those influenced by peers; the opportunities actually available to individuals, including the availability of study places individuals can access readily; and the prior experiences of individuals.

Since the concern is about factors that are ‘unobservable’, it is often difficult to do much that rules out their potential influence. Sometimes, external factors (or ‘instruments’) that induce individuals to obtain a different level of education than they may have otherwise chosen can be used to estimate the effect of education to get around this unobserved heterogeneity problem (see Angrist and Krueger 1999 for discussion of these methods that allow a ‘causal’ interpretation of the education effects). Arguably, these instruments exist for some of the educational choices individuals in the LSAY data make, but there are no really suitable instruments that might be used for the decision to return to study for those who experience a substantial spell of unemployment.

However, in this case, it is possible to use information in the data that are informative about the types of individual heterogeneity researchers often have little information about: ability, tastes for education, occupational ambition, prior experiences, the views of peers and the revealed educational attainment of the neighbours of individuals. Some of this information is included in the base specification, in the form of the school achievement measure, which will reflect individual ability among other factors, and the variable indicating whether subjects had ever been unemployed for six months or longer.

Other information can be used in different ways. One is to supplement the regression equation with additional variables to assess whether and how the qualification effects change. The other is to partition the data to see whether the estimated qualification effects differ between groups. Both approaches are employed here.

First, variables are added to the regression equation that: reflect the proportion of students at the individuals school who indicate that they intend to study at university and (as a separate variable) at a VET institution when they left school; another that reflects that part of young people’s intended future occupations not explained by their background characteristics, which is interpreted as a measure of ambition; and a socio-economic status index for the individuals neighbourhood that is based on the achieved education levels and occupations in which people are employed from that neighbourhood. The school study and neighbourhood variables will reflect peer influences, along with the general availability of educational opportunity, in the case of the neighbourhood index and the occupational ambition variable general levels of ambition that will often have a clear educational implication – many occupations require very specific courses of study. When the equation is re-estimated, along with the predicted probabilities of specification *IV* in Table 10, the estimated qualification effects on full-time employment fall by about two percentage points for each group. Therefore, the inclusion of individual ambition,

the impact of peers and the availability of educational opportunity have only a small impact on the estimated qualification effects.¹⁵

The second way the additional information is used is to partition the data into two groups, reflecting whether individuals indicated when first surveyed that they intended to study at a VET institution after leaving school. The multinomial logit equation is then estimated for both groups and a test of whether the educational qualification effects in the base specification differ between the two groups conducted. If the estimated qualification effects are higher among the group who indicated they intended to study at VET, it may provide evidence that the group who eventually did study had unobserved characteristics that meant they benefited most from VET studies. However, tests of the equivalence of the qualification effects between the two groups did not indicate that they differed. The VET qualification effects were the same regardless of the future study intentions of individuals.

Taken together, these results provide some confidence that the estimated VET qualification effects are not contaminated unduly by problems of unobserved heterogeneity. This possibility cannot be ruled out completely, but the range of controls available certainly provides information on many of the sources of individual differences normally of concern to researchers.

VET qualification wage effects

The evidence on the impact of VET qualifications on wages from Table 5 is muted. Detailed regression analysis of wages conducted for this study suggested that VET qualifications affected the wages individuals in their early twenties received only through their impact on the probability they were employed full-time. Once the hours individuals worked were included in these equations, the significance of the VET qualification effects disappeared. These results are summarised in Table 12, with the detailed regression results behind the specification most like the multinomial logit qualification specification *IV* reported in Appendix Table 3.2.

While such a result seems at odds with research that finds VET qualifications do have an impact on wages, for example Miller and Mulvey (1996, 1997) and Preston (1997), it is consistent with other research that has used these longitudinal data sets of young Australians to analyse the wage effects of VET qualifications. For example, Lamb *et al.* (1998), Long, McKenzie and Sturman (1996), and Marks and Fleming (1998a) find only very small VET wage effects. Marks and Fleming (1998a) also report evidence that VET wage effects diminish with time.

In order to avoid adding further to the length of the paper, these wage equation results are not reported or discussed here in detail. Individuals with VET qualifications do appear to earn somewhat higher wages than their peers, but this effect appears to be wholly a function of their higher full-time employment rates in these data.

Table 12: Summary of VET wage effects

VET qualification effects on wages	No hours effect		With hours effect	
	Effect	<i>t-value</i>	Effect	<i>t-value</i>
VET qualification effect	0.090	(4.29)	-0.010	(-0.65)
No Year 12, but VET qualification	0.044	(1.05)	0.011	(0.36)
Year 12 and qualification	0.101	(4.27)	-0.015	(-0.85)
<i>VET qualification</i>				
Unemployed after VET qualification	-0.087	(-1.28)	-0.019	(-0.35)
Unemployed before VET qualification	0.059	(1.07)	-0.055	(-1.38)
Never unemployed for six months or longer	0.110	(4.80)	-0.003	(-0.17)

6. CONCLUSIONS AND POLICY IMPLICATIONS

This paper has addressed two main research questions. First, what is the impact of education and training qualifications on the labour market outcomes achieved by early school leavers a few years after completing those qualifications? Second, what is the impact of post-school qualifications on those early school leavers who previously experienced a substantial period of unemployment?

In a sense, the results presented here suggest that many general findings in both the international and Australian literature on the effect of educational qualifications apply in the specific context analysed here. Those with educational qualifications experience better labour market outcomes than those without (for example, Marks and Fleming 1998a, 1998b), while individuals who experience a substantial spell of unemployment face poorer future outcomes (for example, Dunlop 2000). Young Australians who experience unemployment but subsequently complete a VET qualification achieve something of a 'half-way' house in terms of their outcomes: their full-time employment outcomes are better than those who experience the same spell of unemployment and never complete a VET qualification, but their outcomes do not match those who complete a qualification but are never unemployed. There are some differences between the results and the extant Australian literature too – these include the finding that the VET qualification effects are broadly similar for males and females in this application.

In relation to the specific research questions addressed in this study, the results of the analysis suggest that the effect of VET qualifications on full-time employment rates are the same for those who do not complete Year 12 as for those who do. Measured against the relevant comparison group, the increase in full-time employment rates for those with VET qualifications compared to those without are about the same across these groups, of the order of 10 to 13 percentage points. Returning to Figure 1, the difference in full-time employment rates between those who follow paths A and B appears to be about the same as the difference between those who follow paths C and D, where the post-school studies undertaken are VET qualifications.

Earlier spells of unemployment of six months or longer act to lower current full-time employment probabilities (the full-time employment rates of those who experience paths E and F in Figure 1 are lower than those who follow C and D). However, those who complete a VET-level qualification following a spell of such unemployment experience improved full-time employment rates compared with those who experience unemployment but complete no later post-school qualifications (the full-time employment rates of those who follow path F > those who follow E). The magnitude of the effect is similar to the increment to the full-time employment probability of those who complete a qualification without undergoing a spell of unemployment over the probability of those who never study and are never unemployed (that is, the difference between the full-time employment rates of those who follow paths F and E \approx the difference between the full-time employment rates of those who follow paths C and D). These results hold for all individuals who complete a VET qualification, not just those who leave school before completing Year 12. The effect of VET qualifications for early school leavers are more difficult to pin down, but cannot be distinguished statistically from those of the group who complete qualifications and never experience a spell of unemployment.

From Table 10 (specification *IV*), the increased probability of being employed full-time for those who complete a VET qualification after a spell of unemployment, compared with those who are unemployed but never complete a qualification, is of the order of 10 to 13 percentage points. This magnitude holds for those who do or do not complete Year 12. Moreover, the effect of completing a VET qualification for this group undoes the negative, scarring effect of a substantial spell of unemployment on their outcomes. The magnitude of the effect is robust to alternative specifications, the groups over which it is estimated and the range of variables included in the regression equation.

The magnitude of the effect points to considerable employment benefits to young individuals who experience substantial spells of unemployment of completing VET qualifications. There was also evidence of positive wage effects, but only through these employment effects, that is there was no hourly wage effect.

These results were generated using data that appears broadly representative of the general population of twenty-two year olds in Australia with estimation approaches that satisfy standard specification tests for their type (see endnote 14). Despite the inclusion of many individual characteristics, such as measured school achievement, self-assessments of school performance, social background and their experience of unemployment, the estimated VET qualification effects broadly match the observed differences in outcomes between groups. This means that the considerable observed heterogeneity between individuals we take account of has little impact on the estimated qualification effects. By definition, it is impossible to be sure that unobserved heterogeneity does not influence the qualification effects estimated, but it is also possible to draw some comfort from the measures of individual differences that were included in the estimated equations. Therefore, these qualification effects should be viewed as informative measures of the impact of completion of a VET qualification by individuals on the outcomes they obtain. Just how well these results can be generalised for other age groups in the population, however, is unclear.

Further, the benefits are obviously only one side of the information base required to know whether others who experience unemployment should be encouraged into pursuing VET studies. No estimates of the costs of VET course completion for the unemployed are made in this paper or of the costs of government provision of these places. Until these are made, it is unclear how channelling the unemployed into courses of studies should be assessed relative to other policy programs that might provide smaller employment benefits but be cheaper to operate.

Overall, the results provide a positive assessment of the impact of VET qualifications in the full-time employment outcomes of individuals who complete them. The better results apparent in the actual data were robust across alternative specifications and remained after the background characteristics of individuals were taken into account, including factors such as school achievement levels, occupational ambitions among young people, earlier revealed intentions to study at VET and the potential impact of peers.

REFERENCES

- Angrist, J.D. and Krueger, A.B. (1999), 'Empirical strategies in labor economics', Chapter 23 in Ashenfelter, O. and Card, D. (eds) *Handbook of Labour Economics*, Volume 3A, Elsevier Science, Holland.
- Ashworth, K., Cebulla, A., Greenberg, D. and Walker, R. (2004) 'Meta-evaluation: Discovering what works best in welfare provision', *Evaluation*, 10 (2), 193 – 216.
- Bradley, S., and Crouchley, R., and Oskrochi, R., (2003) Social exclusion and labour market transitions: a multi-state multi-spell analysis using the BHPS, *Labour Economics*, 10, pp 659 – 679.
- Cramer, J.S. and Ridder, G. (1991), 'Pooling states in the multinomial logit model', *Journal of Econometrics*, 47, pp 267 – 272.
- Cobb-Clark, D.A. and Crossley, T. (2003), Econometrics for evaluations: an introduction to recent developments, *Economic Record*, 79, 491-511.
- Dearden, L. McGranahan, L and Sianesi, B. (2004) *An In-Depth Analysis of the Returns to National Vocational Qualifications Obtained at Level 2*, Centre for Economics of Education Discussion Paper No. 46.
- Dearden, L., McIntosh, S., Myck, M. and Vignoles, A. (2002), 'The returns to academic, and vocational qualifications in Britain', *Bulletin of Economic Research*, 54 (3), 249 – 274.
- Dockery, A.M. (2002), 'The New Enterprise Incentive Scheme: An evaluation and a test of the Job Network', *Australian Journal of Labour Economics*, 5 (3), pp 351 – 371.
- Dunlop, Y. (2000), *Labour Market Outcomes of Low Paid Australian Workers: an application using the 1994 – 1997 Survey of Employment and Unemployment Patterns*, Australian Bureau of Statistics Occasional Paper, (Cat. No. 6293.0.00.005).
- Greenberg, D., Ashworth, K., Cebulla, A. and Walker, R. (2004) "Do welfare-to-work programs work for long?", *Fiscal Studies*, 25 (1), 27 – 53.
- Griliches, Z. (1980), 'Schooling interruptions, work while in school and the returns to schooling', *Scandinavian Journal of Economics*, 82, pp. 291 – 303.
- Hausman, J.A. and McFadden, D. (1984), 'Specification tests for the multinomial logit model', *Econometrica*, 52, pp.1219 – 1240.
- Heckman, J.J., LaLonde, R.J. and Smith, J.A. (1999), 'The economics and econometrics of active labor market programs', Chapter 31 in Ashenfelter, O. and Card, D. (eds) *Handbook of Labour Economics*, Volume 3A, Elsevier Science, Holland.
- Hotz, V.J., Imbens, G.W. and Klerman, J.A. (2000), *The Long-term gains from GAIN: A Re-analysis of the Impacts of the Californian GAIN Program*, NBER Working Paper No. 8007, National Bureau of Economic Research.
- Jenkins, A (2004), *Women, Lifelong Learning and Employment*, Centre for Economics of Education Discussion Paper No. 39.
- Jenkins, A., Vignoles, A., Wolf, A. and Galindo-Rueda, F. (2002), *The Determinants and Labour Market Effects of Lifelong Learning*, Centre for Economics of Education Discussion Paper No. 19.
- Lamb, S. (1996), *Completing School in Australia: Trends in the 1990s*, Longitudinal Surveys of Australian Youth, Research Report No 1, Australian Council for Educational Research, Melbourne.
- Lamb, S, Long, M and Malley, J (1998), *Access and equity in vocational education and training: Results from longitudinal surveys of Australian youth*, Australian Council for Educational Research Research Monograph No. 55, Melbourne: ACER Press.
- Light, A. (1995), 'The effects of interrupted schooling on wages', *Journal of Human*

-
- Resources*, 30, pp. 472 – 502.
- (1996), ‘Hazard model estimates of the decision to reenrol in school’, *Labour Economics*, 2, pp. 381 – 406.
- Long, M., McKenzie, P. and Sturman, A. (1996), *Labour market and income consequences of participation in TAFE*, Australian Council for Educational Research Research Monograph No. 49, Melbourne: ACER Press.
- Marcus, R.D. (1984) ‘Measuring the rate of return to interrupted schooling’, *Journal of Educational Statistics*, 9, pp. 295 – 310.
- (1986) ‘Earnings and the decision to return to school’, *Economics of Education Review*, 5, pp. 309 – 317.
- Marks, G. N. and Fleming N. (1998a), *Factors Influencing Youth Unemployment in Australia: 1980 – 1994*, Longitudinal Surveys of Australian Youth Research Report No 7, ACER, Melbourne.
- (1998b) *Youth Earnings in Australia 1980-1994: A Comparison of Three Youth Cohorts*, Longitudinal Surveys of Australian Youth Research Report No 8, ACER, Melbourne.
- Marks, G.N., and Long, M. (2000), *Weighting the 1995 Year 9 Cohort Sample for Differential Response Rates and Sample Attrition*, Longitudinal Surveys of Australian Youth Technical Paper No 15, Australian Council for Educational Research, Melbourne.
- Marks, G. N., Hillman, K. and Beavis, A. (2003), *Dynamics of the Australian Youth Labour Market: The 1975 Cohort, 1996 – 2000*, Longitudinal Surveys of Australian Youth Research Report No 34, ACER, Melbourne.
- Marks, G.N., Fleming, N., Long, M. and McMillan, J. (2000), *Patterns of Participation in Year 12 and Higher Education in Australia: Trends and Issues*, Longitudinal Surveys of Australian Youth Research Report No 17, Australian Council for Educational Research, Melbourne.
- Martin, J.P. (2000), What works among active labour market policies: evidence from OECD countries’ experiences, *OECD Economic Studies*, 30, 81 – 113.
- Miller, P.A. (1984), ‘The Causes and Consequences of Interruptions to Full-Time Education’, *Australian Economic Papers*, 23, pp. 61 – 70.
- Miller, P. and Mulvey, C. (1996), Unions, firm size and wages, *Economic Record*, 72, 138-153.
- (1997), Computer skills and wages, *Australian Economic Papers*, 36, 106 – 113.
- Preston, A 1997, ‘Where are we now with human capital theory in Australia’, *Economic Record*, 73 (220) 51-78.
- Riddell C. and W.C. Riddell (2005), *Educational Upgrading and its Consequences Among Welfare Recipients: Empirical Evidence from the Self-Sufficiency Project*, unpublished paper, University of British Columbia.
- Ryan, C.A. 2000, *Where to next? A Comparison of the Outcomes and Destinations of Graduates from the Australian Higher Education and Vocational Education and Training Sectors*, National Centre for Vocational Education Research, Adelaide.
- (2001a), *Individual returns to vocational education and training qualifications: their implications for lifelong learning*, National Centre for Vocational Education Research, Adelaide.
- (2001b), *What are the longer term outcomes for individuals of completing vocational education and training qualifications?*, National Centre for Vocational Education Research, Adelaide.
- Ryan C.A. and Watson, L. (2004) “Year 12 completion and retention in Australia in the

-
- 1990s”, *Australian Journal of Labour Economics*, 7 (4), pp 481 – 500.
- Saunders, P. and Brown, J. (2004), ‘Explaining welfare to work transitions among the unemployed’, *Australian Journal of Labour Economics*, 7(3) pp 397 – 410.
- Stewart, M.B. and Swaffield, J.K. (1999), ‘Low pay dynamics and transition probabilities’, *Economica*, 66, 23 – 42.
- Strombach, T. and Dockery, A.M. (2000), *Labour Market Programs, Employment and Unemployment Hazards: an application using the 1994 – 1997 Survey of Employment and Unemployment Patterns*, Australian Bureau of Statistics Occasional Paper, (Cat. No. 6293.0.00.002).
- Webber, M. and Weller, S. (2002), ‘What happens when you are retrenched from an old declining industry?’ in Saunders, P. and Taylor, R. (eds), *The Price of Prosperity: The Economic and Social Costs of Unemployment*, UNSW Press, Sydney.
- Wooldridge, J. (2002), *Econometric Analysis of Cross Section and Panel Data*, Massachusetts Institute of Technology Press, Massachusetts.

Appendix 1: Methodology

In this appendix, the regression methodology employed in this paper is set out a little more formally than in the body of the paper for readers with a technical interest.

Let y_i be some outcome measure of interest for individual i ; let X_i be a set of exogenous conditioning variables, consisting of personal characteristics and labour market conditions; and let S_i reflect the Year or grade of schooling completed by individual i . Finally let Q_i capture the post-school qualifications held by individual i .

The two issues of interest for the first research question of this paper are whether the average difference in the outcome variable associated with post-school qualifications, conditional on the background and labour market variables is: first, positive; and second, the same for early school leavers as individuals who have completed Year 12.

In the analysis of labour market outcomes to address this question, regression estimation involves equations of the form:

$$(1) \quad y_i = X_i \beta + S_i \alpha + d_i Q_i \gamma + (1-d_i) Q_i \delta + e_i$$

where d_i is an indicator variable that takes the value one if the individual has completed Year 12 and zero otherwise, e_i is an error term and the Greek letters, α , β , γ and δ , are parameters to be estimated.

The purpose of this regression equation is to test (and, perhaps, reject) the hypotheses that: (i) $\delta = 0$ and (ii) $\gamma - \delta = 0$, that is, whether post-school qualifications have any impact on the outcomes of individuals who have not completed year 12 and whether the impact of common qualifications are the same whether individuals have completed year 12 or not.

The issue of interest for the second research question of this paper involves analysis of whether the average difference in the outcome variable associated with post-school qualifications among early school leavers is the same whether or not they have experienced a significant period of unemployment. In this case, the specification of the regression equation becomes:

$$(2) \quad y_i = X_i \beta + S_i \alpha + d_i Q_i \gamma + (1-d_i) (1-u_i) Q_i \delta + (1-d_i) u_i Q_i \theta + e_i$$

where all variables are as already defined and θ is a parameter to be estimated. In terms of the sequence of events, the experience of unemployment in equation (2) must precede the study of qualifications for $u_i = 1$, otherwise $u_i = 0$. The question of interest for the second research question has two parts: first whether $\theta = 0$ and second, whether $\theta = \delta$, that is, that the parameters on the impact of post-school qualifications for individuals who did not complete year 12 are the same depending on whether they have experienced a significant period of unemployment. We also take account of the time since individuals completed their post-school qualifications in estimation of equation (2).

As noted in the body of the paper, one issue for estimation is that the education choices – level of school completed and participation in post-school education are likely to be endogenous or made with the better outcomes education provides in mind by the

decision-makers. If they are, regression equations parameter estimates that ignore this endogeneity will be biased and inconsistent (Wooldridge 2002). In estimation of the regression equations (1) and (2), we initially treat these variables as exogenous and later report the impact on the estimates where we attempt to deal with this potential endogeneity.

Since the dependent variable in the main outcomes equation eventually estimated is categorical, with the categories set out in Table 1 of the text, the equation was estimated as a multinomial logit equation. The probability for a given choice is estimated by:

$$\Pr(Y_i = j | X_i, S_i, Q_i) = \frac{e^{z_i' \phi_j}}{\sum_{k=1}^5 e^{z_i' \phi_k}}, \text{ with } j = 1, 2, 3, 4, 5 \text{ for the five categories in Table 1}$$

and $z_i' \phi = X_i \beta + S_i \alpha + d_i Q_i \gamma + (1-d_i)(1-u_i) Q_i \delta + (1-d_i) u_i Q_i \theta$, as in equation (2). Five sets of parameters, one for each possibility, are required. A normalisation is required to estimate these parameters, that $\phi_l = 0$, so that $\exp(z_i' \phi_l) = 1$. These results are reported in Table 3.1 of Appendix 3.

Where we analyse wage outcomes, the equation is estimated via least squares. The results appear in Table 3.2 of Appendix 3.

Appendix 2: Description of the samples and variable definitions

The samples analysed

The data on individuals are drawn from two samples, the *Youth in Transition* 1975 birth cohort and the *Longitudinal Surveys of Australian Youth* 1995 Year 9 cohort. The YIT survey commenced with classroom-based literacy and numeracy tests in 1989 when the cohort was aged fourteen. Individuals also completed a questionnaire that collected background information at that time. They were followed by mail survey in subsequent years. The LSAY 95 cohort also commenced with classroom-based literacy and numeracy tests undertaken in 1995 when the modal age of the cohort was fourteen years. Individuals also completed a questionnaire that collected family background information. Individuals were initially followed by mail survey, but the data collection methodology moved to phone surveys from 1997.

Variable descriptions and summary statistics

The following table, Table 2.1 contains descriptions of the variables used in this paper and summary statistics for the sample of individuals analysed for the variables whose mean values are not provided in the body of the paper. Summary statistics are provided for the two cohorts separately. Many of the variables are indicator variables that show the proportion of the cohort with the specific characteristic. For example, 61 per cent of the first cohort went to a school situated in a metropolitan region.

Table 2.1: Variable descriptions and summary statistics

Variable	Definition	YIT 75		LSAY 95	
		Mean	Std Dev.	Mean	Std Dev.
Parent's occupation – ANU 3 ^a	Parent's occupation based on the ANU 3 occupational scale, with values assigned on the basis of First edition ASCO minor group occupations. Mother's occupation used where Father's not provided.	38.1	22.5	37.9	22.8
Metropolitan region ^b	Attended a school in a metropolitan region when first surveyed.	0.610	0.488	0.542	0.498
Catholic school ^b	Attended a Catholic school when first surveyed.	0.101	0.301	0.124	0.330
Independent school ^b	Attended an Independent school when first surveyed.	0.182	0.386	0.205	0.404
Self-assessed school performance – well above average ^c	Individual indicated that compared to their peers in their class they were 'well above average'.	0.153	0.360	0.172	0.377
Self-assessed school performance – above average ^c	Individual indicated that compared to others in their class they were 'above average'.	0.419	0.493	0.388	0.487
Self-assessed school performance – average ^c	Individual indicated that compared to others in their class they were 'average'.	0.366	0.482	0.412	0.492
Victoria	State when first surveyed	0.265	0.441	0.241	0.428
Queensland		0.190	0.393	0.187	0.390
South Australia		0.087	0.282	0.074	0.261
Western Australia		0.096	0.295	0.109	0.312
Tasmania		0.030	0.170	0.032	0.177
Northern Territory		0.008	0.089	0.007	0.082
Australian Capital Territory		0.018	0.134	0.019	0.136
Unemployment rate		State unemployment rate in Year outcomes are measured.	8.2	1.0	6.1
Proportion male	Gender	0.469	0.499	0.482	0.500
Years since completed VET qualification	Years since completed VET qualification	0.8	1.5	1.3	1.9
Years since completed degree	Years since completed degree	0.2	0.5	0.2	0.5

Table 2.1: Variable descriptions and summary statistics (continued)

Variable	Definition	YIT 75		LSAY 95	
		Mean	Std Dev.	Mean	Std Dev.
Individual born o/s, English-speaking ^a	Individual born overseas in a predominantly English-speaking country	0.165	0.371	0.180	0.384
Individual born o/s, non-English-speaking ^a	Individual born overseas in a non-English-speaking country	0.102	0.303	0.090	0.287
Achievement ^c	Average of numeracy and literacy scores from tests undertaken in the first survey year.	50.5	8.9	50.7	8.0
School average intention: Uni study ^b	Proportion at school who indicated in first survey year they intended to study at a University when they left school	0.286	0.154	0.270	0.135
School average intention: VET study ^b	Proportion at school who indicated in first survey year they intended to study at a TAFE when they left school	0.477	0.203	0.473	0.189
Occupational Ambition	Standardised residual from an equation explaining reported future occupation of individuals. Equation included background variables from Table 3.1.	-0.035	0.983	0.025	0.994
Plan to study at VET	Individual indicated in first survey year they intended to study at a TAFE after leaving school	0.266	0.442	0.254	0.435
Neighbourhood SES	ABS SEIFA Education and Occupation Socio-economic status index, based on 1991 census districts.	1005.7	97.7	1005.4	94.3
Employed full-time	Individual worked no less than 35 hours per week in their main job in October of the relevant year in YIT 75 or at the time of the survey in LSAY 95.	0.554	0.497	0.567	0.495
Employed part-time	Individual worked less than 35 hours per week in their main job in October of the relevant year in YIT 75 or at the time of the survey in LSAY 95.	0.209	0.407	0.277	0.448
Studying	Individual reported they were studying in October of the relevant year in YIT 75 or at the time of the survey in LSAY 95.	0.149	0.356	0.167	0.373
Substantial spell of unemployment	Individual reported at any time after they left school they were looking for work in six consecutive months.	0.189	0.391	0.199	0.399
Number of observations		1943		4840	

Notes:

a. based on responses provided in 1991 in YIT 75 and 1995 in LSAY 95

b. based on school and individual characteristics in 1989 in YIT 75 and 1995 in LSAY 95

c. based on responses provided by individuals in 1990 in YIT 75 and 1995 in LSAY 95

APPENDIX 3: Detailed Tables Of Regression Results

Table 3.1: Multinomial logit equation of determinants of early twenties activities

	Studying, not employed			Studying, employed part-time			Not studying, employed part-time			Employed full-time		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Year 12	2.05	0.29	6.97	1.80	0.20	9.18	0.68	0.13	5.16	0.52	0.10	5.21
VET qualification	-0.25	0.16	-1.56	0.03	0.12	0.21	0.67	0.12	5.78	0.71	0.09	7.83
Degree	-1.20	0.17	-7.18	-1.70	0.17	-9.81	0.40	0.12	3.25	0.08	0.11	0.71
Attended Metropolitan school	0.08	0.14	0.63	0.64	0.12	5.30	0.16	0.11	1.52	0.05	0.09	0.59
Attended Independent school	0.54	0.16	3.49	0.43	0.16	2.58	-0.10	0.14	-0.75	-0.07	0.12	-0.59
Attended Catholic School	0.38	0.18	2.18	0.54	0.14	3.77	0.27	0.14	1.91	0.22	0.11	1.98
Born o/seas, NESB country	0.70	0.17	4.06	0.19	0.15	1.25	-0.10	0.15	-0.64	-0.18	0.12	-1.47
Born o/seas, Eng-speaking country	0.30	0.21	1.40	0.30	0.17	1.70	0.29	0.17	1.74	0.15	0.15	1.03
Parental SES	0.01	0.00	1.82	0.01	0.00	2.34	0.00	0.00	-0.70	0.00	0.00	-0.45
Male	0.44	0.13	3.38	-0.06	0.11	-0.52	-0.16	0.10	-1.65	0.46	0.08	5.40
Victoria	-0.16	0.21	-0.77	0.02	0.17	0.14	0.06	0.16	0.41	-0.13	0.13	-1.02
Queensland	0.13	0.22	0.60	-0.01	0.20	-0.05	0.13	0.17	0.78	-0.04	0.14	-0.25
South Australia	0.45	0.22	2.00	0.32	0.20	1.60	0.39	0.19	2.11	0.25	0.16	1.62
Western Australia	0.07	0.21	0.32	-0.08	0.22	-0.36	-0.19	0.19	-1.00	-0.12	0.16	-0.80
Tasmania	-0.19	0.37	-0.51	0.11	0.36	0.30	0.63	0.27	2.34	0.29	0.22	1.36
Northern Territory	0.54	0.43	1.27	-0.60	0.48	-1.26	-0.12	0.33	-0.36	-0.06	0.29	-0.20
Australian Capital Territory	-0.55	0.33	-1.70	-0.54	0.24	-2.28	-0.55	0.24	-2.26	-0.42	0.20	-2.17
School Achievement	0.06	0.01	6.30	0.06	0.01	7.58	0.01	0.01	2.01	0.01	0.01	1.84
Ever unemployed 6 months	-0.34	0.15	-2.19	-0.90	0.13	-7.14	-0.51	0.11	-4.47	-0.95	0.09	-10.46
Unemployment rate	-0.09	0.06	-1.53	-0.32	0.05	-6.12	-0.27	0.05	-5.53	-0.18	0.04	-4.96
Self-ass. achievement- well above average	0.96	0.45	2.12	1.01	0.35	2.87	-0.12	0.28	-0.43	0.40	0.22	1.83
Self-ass. achievement- above average	0.81	0.43	1.88	0.80	0.34	2.37	0.04	0.26	0.16	0.42	0.20	2.11
Self-ass. achievement- average	0.25	0.43	0.57	0.46	0.34	1.36	-0.03	0.26	-0.12	0.38	0.20	1.92
Constant	-6.11	0.79	-7.73	-3.47	0.63	-5.47	0.57	0.55	1.05	1.29	0.42	3.10

Table 3.2: Wage regression results

	No hours effects		With hours effects	
	Effect	t-value	Effect	t-value
Attended Metropolitan school	-0.057	-2.72	0.022	1.39
Male	0.148	7.55	0.039	2.40
Victoria	-0.089	-2.82	-0.037	-1.62
Queensland	-0.046	-1.33	-0.051	-2.10
South Australia	-0.007	-0.20	-0.015	-0.54
Western Australia	-0.067	-1.99	-0.058	-2.48
Tasmania	-0.036	-0.75	-0.035	-1.25
Northern Territory	-0.046	-0.91	-0.084	-2.74
Australian Capital Territory	-0.013	-0.29	-0.016	-0.52
School Achievement	-0.005	-3.32	0.001	1.29
Degree	0.193	7.24	0.079	3.93
VET qualification prior to unemployment	-0.087	-1.28	-0.019	-0.35
VET qualification after unemployment	0.059	1.07	-0.055	-1.38
VET qualification and never unemployed	0.110	4.80	-0.003	-0.17
Year 12	-0.133	-5.04	-0.016	-0.81
Hours			0.099	14.79
Hours squared/100			-0.147	-8.48
Hours cubed/100			0.007	5.49
Ever unemployed 6 months	0.005	0.55	-0.010	-1.71
Unemployment rate	-0.044	-1.32	-0.035	-1.32
Constant	6.292	63.36	4.217	38.63
Number of observations	5630		5559	
F(17, 539)	11.2		120.8	
R-squared	0.032		0.447	

ENDNOTES

¹ As more waves of the Household Income, Labour Dynamics in Australia (HILDA) survey become available, it will be possible to estimate the effects of completion of qualifications among the general Australian population on labour market outcomes. The Survey of Employment and Unemployment Patterns (SEUP), conducted by the Australian Bureau of Statistics, was a longitudinal survey that followed individuals for three years. It contained a small nationally representative sample of the population and a larger group of 'jobseekers', but the number of individuals who completed qualifications after an experience of unemployment within the three years the individuals were followed is likely to be small.

² Presumably some of those employed full-time are also studying, but we treat full-time employment as their principal activity. In the ABS Labour Force Survey, some 2.5 per cent of the population of 20 to 24 year olds were both full-time students and full-time employees (ABS 2003).

³ As will become evident, these wages are measured in different calendar years, so wage deflators are used to make the wages received in different years comparable. The deflator used is the average change in ordinary time average weekly earnings, with wages adjusted to 2004 dollars.

⁴ This can create difficulties in estimating the impact of qualifications and labour market experience on wages, in particular, since any time spent in studies must lower the effective labour market experience of individuals. In the wage equation results discussed briefly in this paper, experience is not included in the equation.

⁵ For the December quarter 2003, the proportions were 24 per cent not working, 23 per cent employed part-time and 53 per cent employed full-time.

⁶ The dependent variable was a dummy variable equalling one if the observation was from the 1995 cohort. The explanatory variables included all those reported in Table 3.1 from Appendix 3, other than the education variables. Some variables were significant. These were State dummies and the school type variables, reflecting changes in design features between the cohorts. The other significant variable was the unemployment rate, which was higher for the first cohort than the second.

⁷ The weights are also designed to deal with the original stratification of the surveys. The weights for both cohorts are constructed in the manner described in Marks and Long (2000). The attrition correction re-weights the achieved sample so that it matches the original distribution of school achievement by gender in the two cohorts.

⁸ It is worth noting that the LSAY 95 cohort had a Year 12 completion rate of 76 per cent if responses from 1998 are used, but 81 per cent if 2003 responses are used. While some of this difference is accounted for by delayed completion by individuals, much of the difference is that the attrition weights do not penalise sufficiently through the school achievement corrections those Year 12 completers who remain in the panel.

⁹ In linear models, such as least squares, these three parameters are identical, unless random coefficient models that allow for individual heterogeneity are estimated (see Cobb-Clark and Crossley 2003 for discussion about these different effects). In non-linear models such as the multinomial logit model, estimated effects on the probability of some specific outcome category occurring also depend on the values taken by the other explanatory variables. Where the average values of these variables differ between groups, the estimated effects will also differ between them.

¹⁰ This was true both when the VET qualifications were allowed to vary between those completing Year 12 and those not and when the parameters were constrained to be the same. In the latter case this was possible because, in non-linear models the derivative of the marginal qualification effect with respect to another variable is not zero.

¹¹ Separate VET qualification effects were estimated for groups with different experiences of unemployment.

¹² An alternative specification allowed the impact of VET qualifications to vary only for those who did not complete Year 12. The predicted probabilities were similar to those presented in Table 10 for specification *V*, with the exception of the group who completed their VET qualifications after their spell of unemployment. However, there were problems with small cell sizes for some of the outcome categories for that group, so we prefer to emphasise the specification described in the text.

¹³ These estimates are available from the authors on request.

¹⁴ The specification survived a Hausman and McFadden (1984) test of the Independence of Irrelevant Alternatives assumption of the multinomial logit model and Cramer and Ridder (1991) tests of whether the 'studying and working part-time' category of the dependent variable could be collapsed with either the 'studying, not working part-time' or 'working part-time, not studying' categories.

¹⁵ These estimates are available from the authors on request.