



# The labour market returns to further education for working adults



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Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person or firm. The tables in this paper contain information about groups of people so that the confidentiality of individuals is protected.

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Any person who had access to the unit-record data has certified that they have been shown, have read, and have understood section 81 of the Tax Administration Act 1994, which relates to privacy and confidentiality. Any discussion of data limitations or weaknesses is in the context of using the Linked Employer–Employee Database for statistical purposes, and is not related to the ability of the data to support Inland Revenue’s core operational requirements.

Careful consideration has been given to the privacy, security, and confidentiality issues associated with using tax data in this project. A full discussion can be found in *Linked Employer–Employee Database Project: Privacy impact assessment* (Statistics New Zealand, 2003).

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## **ABSTRACT**

A growing number of adults have been enrolling in tertiary education to gain new qualifications. This paper investigates the labour market benefits that were obtained by working adults aged 25 to 64 years, who enrolled with a tertiary education provider and completed a certificate or diploma at levels 1-6, from 2003 to 2005.

We focus on people who were employed both before and after their spell of tertiary study and use longitudinal administrative data from the Employment Outcomes of Tertiary Education (EOTE) dataset to estimate the impact of education on their subsequent growth in average monthly earnings. We use a difference-in-difference approach and compare the earnings changes experienced by the study group members over the pre-study to post-study period, with the earnings changes experienced by a matched comparison group of working adults who did not return to education.

Students who completed a level 1–3 or level 4 certificate generally did not increase their earnings relative to the comparison group. However, earnings benefits were gained by students who completed a certificate in a small number of fields of study. On average, diplomas were associated with earnings benefits for women but not men. There were substantial variations by subject field, however, with diploma students in some fields experiencing substantial increases in their relative monthly earnings and those in other fields experiencing relative earnings losses or no effect.

Overall, there was only limited evidence of beneficial impacts. Several factors may have contributed to this result. First, sixty percent of the working adults in the study were already qualified at an equivalent or higher level, and so did not raise their educational attainment level by completing a new certificate or diploma. Second, many certificates and diplomas required the equivalent of one year or less of full-time study to complete. The absence of more significant labour market impacts may partly reflect the short duration of these qualifications.

## SUMMARY

### Key findings

This paper investigates the earnings benefits obtained by adults aged 25–64 years who completed a certificate or diploma-level qualification (levels 1–6 on the New Zealand Qualifications Framework by studying at a tertiary education provider between January 2003 and December 2005.<sup>1</sup>

The paper's main analysis uses longitudinal administrative data from the Employment Outcomes of Tertiary Education (EOTE) data set. The EOTE data set lacks some important variables (including measures of hours worked and wage rates). Therefore, we extend the main findings through a supplementary analysis of the research problem using longitudinal survey data from the Survey of Families, Incomes and Employment (SoFIE).

To estimate the impact of gaining a certificate or diploma, we compare the growth in the average monthly earnings of the students from before the enrolment to three years after the qualification was gained with the earnings growth experienced by a comparison group of matched non-students over the same period. We analyse the difference in earnings that was apparent in the third year after the students completed their qualifications.

- Level 1–4 certificates
  - Students who completed a certificate at levels 1–3 or level 4 generally had not increased their average monthly earnings, relative to those of the comparison group (matched non-students), by three years after completion.
  - Students in a small number of specific fields of study did obtain earnings benefits. Those who completed certificates in most other fields experienced no effect or reductions in their relative earnings.
- Level 5–6 diplomas
  - Diplomas were associated with an increase in relative earnings for women but not men.
  - As for certificates, there was substantial variation in impacts by field of study. Diploma students in some specific fields gained substantial increases in their relative monthly earnings, while those in other fields experienced relative earnings losses or no significant effect.

Average monthly earnings are affected by changes in hours of work as well as changes in wage rates. The beneficial impacts of further education on earnings, when experienced, may have been due to an increase in hours worked, an increase in wages, or a combination of both, and it is not possible to separately identify those two effects.

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<sup>1</sup> Qualifications that were gained through industry training and short qualifications involving less than 3 months of study were excluded.



## Research question

This study addresses the question of whether working adults who successfully undertake further tertiary education at certificate or diploma level gain labour market benefits afterwards. It focuses on the impact of these qualifications on students' level of earnings in the third year after the completion of the qualification.

Further education provides opportunities for adults to develop, extend, or update their skills. If the additional skills they gain are valued by employers, this should assist them to gain higher wages. Additional skills could also improve a student's employability or enable them to change their occupation or career. The latter could have monetary benefits that are reflected in higher earnings, or it could simply result in non-monetary benefits such as higher job satisfaction.

This study focuses on earnings impacts rather than employment impacts because earnings are measured more accurately than employment rates in the main data source (EOTE), and because the study design does not allow us to determine whether any changes in post-study employment rates are due to the impacts of further education on employability or to students' labour supply choices.

The paper does not attempt to evaluate the overall financial benefit of the further education to the students, taking into account costs as well as benefits.

## Data sources

The main data source for this study is the EOTE data set. This data set was recently created by Statistics New Zealand by linking administrative data on participation and achievement in the publicly funded tertiary education system with administrative data on individuals' earnings and incomes from the Linked Employer–Employee Database (LEED).

SoFIE was used as a secondary data source. SoFIE is a longitudinal household survey that contains measures of educational achievement and hours worked that are not available in EOTE. We estimated alternative models of the impact of further study on earnings using the SoFIE sample to extend our understanding and interpretation of the EOTE-based results. We could not use SoFIE for the main analysis because the number of mature students in the sample was too small to yield statistically significant estimates of the impact of further education. In addition, the level 1–4 qualifications that are recorded in SoFIE include qualifications gained through industry training, which were excluded from the main EOTE-based analysis.<sup>2</sup>

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<sup>2</sup> The labour market returns to industry training were the subject of an earlier research paper (Crichton, 2009).

## **Study population and methods**

### **Main analysis**

The main study population comprises adults aged 25–64 years who began an episode of tertiary study with a tertiary education provider between January 2003 and December 2005, completed a level 1–6 qualification by the end of 2005, had been working in waged or salaried employment during the three years before their enrolment (for at least six months), and were employed in a waged or salaried job in the third year after the completion of the qualification (for at least six months).<sup>3</sup> We have detailed information on the monthly earnings of this study population during the three years before they began to study, the study period, and three years after the qualification was completed.

Approximately 60 percent of the students in the main study population were women, reflecting the gender mix of mature students at tertiary institutions. About 40 percent were aged 25–34, one-third aged 35–44, and the remaining one-quarter aged 45–64. About 63 percent of the students were studying on a full-time basis, although the full-time/part-time split varied by the level of the qualification.

We construct a matched comparison group to provide a counterfactual estimate of the employment and earnings changes that the study population members are likely to have experienced if they had not undertaken further study. The comparison group members are non-students selected so that their demographic characteristics and their employment and earnings histories during the three years before the students' return to education closely match those of the study population members.

To estimate the impact of gaining a qualification we compare the growth in the students' average monthly earnings from the period 7–36 months before the study spell began to the period 25–36 months after completion with the growth in the monthly earnings of the matched non-students over exactly the same period. The pre-study to post-study period varies across students but is approximately five years on average.

### **Supplementary analysis**

The supplementary analysis using data from SoFIE examines the earnings growth of a similar study population and comparison group. We estimate the impact of gaining a qualification on hourly, weekly, and monthly earnings by comparing the pre-study to post-study earnings growth experienced by the students with the earnings growth experienced by the comparison group, using regression methods to adjust for differences in characteristics. The pre-study to post-study analysis period is six years.

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<sup>3</sup> International students and domestic students who were undertaking industry training are excluded. Students who enrolled for less than 0.25 effective full-time years of study (EFTS) or studied for less than 3 months are also excluded.

## Main findings

Tables S1 and S2 summarise our main estimates of the impact of gaining a qualification on average monthly earnings by gender, gender and age group, and broad field of study, obtained from regression models that compare the earnings growth of the student and matched comparison group samples.

These estimates represent the percentage difference in earnings that can be attributed to the education, measured in the third year after completion of the qualification. Positive numbers (that is, earnings premiums) indicate that the students had faster earnings growth during or after the completion of their tertiary study than the comparison group. Negative numbers (that is, earnings penalties) indicate slower earnings growth. Results shown in bold in the tables are statistically significant.

**Table S1:** Estimated percentage impact on students' relative monthly earnings in the third year after completion, by highest qualification gained, age, and sex

| Level                  | Total       | Males Females |            | Males       |             |              | Females     |             |             |
|------------------------|-------------|---------------|------------|-------------|-------------|--------------|-------------|-------------|-------------|
|                        |             |               |            | 25–34 years | 35–44 years | 45–64 years  | 25–34 years | 35–44 years | 45–64 years |
| Level 1–3 certificates | <b>-2.0</b> | <b>-4.2</b>   | -0.5       | <b>-6.2</b> | <b>-2.8</b> | -2.5         | -1.9        | 0.0         | 0.6         |
| Level 4 certificates   | -0.9        | <b>-1.8</b>   | -0.3       | <b>-4.1</b> | -0.8        | -0.5         | -0.8        | -0.8        | 0.6         |
| Diploma                | 1.9         | <b>-5.9</b>   | <b>6.8</b> | <b>-4.4</b> | -4.0        | <b>-13.8</b> | <b>7.1</b>  | <b>11.0</b> | -0.8        |

Notes: Estimates in bold are statistically significant at the 5 percent level.

**Table S2:** Estimated percentage impact on students' relative monthly earnings in the third year after completion, by highest qualification gained and major field of study

| Major field of study                  | Level 1–3 certificates |              | Level 4 certificate |              | Diploma      |             |
|---------------------------------------|------------------------|--------------|---------------------|--------------|--------------|-------------|
|                                       | Males                  | Females      | Males               | Females      | Males        | Females     |
| Science                               | s                      | s            | s                   | s            | s            | s           |
| Information technology                | <b>-9.1</b>            | 3.4          | s                   | s            | -4.0         | 10.8        |
| Engineering                           | 0.2                    | -2.4         | 1.8                 | s            | <b>8.9</b>   | s           |
| Architecture & building               | 0.9                    | s            | 2.5                 | s            | s            | s           |
| Agriculture & environment             | <b>-5.4</b>            | -2.7         | -3.8                | -5.6         | s            | s           |
| Health                                | -2.6                   | 0.3          | -1.0                | 1.9          | s            | 2.6         |
| Education                             | s                      | <b>-19.5</b> | s                   | <b>-12.2</b> | -7.1         | <b>10.4</b> |
| Commerce                              | 0.1                    | 3.0          | 1.7                 | -1.4         | 8.6          | <b>13.0</b> |
| Society & culture                     | <b>-5.1</b>            | <b>7.4</b>   | <b>-3.5</b>         | <b>4.0</b>   | <b>-12.0</b> | 5.0         |
| Creative arts                         | <b>-13.3</b>           | -0.2         | <b>-11.7</b>        | <b>-13.8</b> | <b>-14.2</b> | 3.0         |
| Food, hospitality & personal services | <b>-19.4</b>           | <b>-16.5</b> | s                   | <b>-10.6</b> | s            | -12.2       |
| Employment & social                   | <b>-8.1</b>            | -3.2         | s                   | s            | s            | s           |
| Total                                 | <b>-4.2</b>            | -0.5         | <b>-1.8</b>         | -0.4         | <b>-5.9</b>  | <b>6.8</b>  |

Notes: Estimates in bold are statistically significant at the 5 percent level. Estimates based on fewer than 50 students have been suppressed (s).

### **Level 1–3 certificates**

Certificates at levels 1–3 were associated with a 4 percent reduction in the relative earnings of men, on average, but no significant impact on the earnings of women.

Certificates in the 'society and culture' field gained by women were associated with an earnings premium of 7 percent. We did not find significant earnings benefits for students in any of the other broad fields of study or gender–age subgroups.

### **Level 4 certificates**

Certificates at level 4 were associated with a 2 percent reduction in the relative earnings of men, on average, but no significant impact on the earnings of women.

Women who completed a level 4 certificate in the society and culture field improved their relative earnings by 4 percent. This was the only positive and significant field of study result that we identified at the 'broad field' level. Further analysis by detailed field of study showed that women who completed certificates in office studies, nursing, public health, and language and literature (nearly all in Te Reo Māori) improved their earnings by 22 percent, 18 percent, 14 percent, and 5 percent respectively. Certificates in other fields were associated with no improvement in relative earnings or relative earnings losses.

### **Level 5–6 diplomas**

Diplomas were associated with an 8 percent increase in the relative earnings of women, on average, and a 6 percent reduction in the relative earnings of men, on average.

Gaining a diploma was associated with faster earnings growth for women in the 25–34 and 35–44 year age groups, whose average monthly earnings were 7 percent and 11 percent higher than those of the comparison group in the third year after completion. Women aged 45–64 did not improve their relative earnings, and males in all age groups experienced reductions.

Disaggregating impacts by broad field of study, we found significant variations. Men who completed diplomas in engineering improved their relative earnings by 9 percent, and women who completed diplomas in education and commerce obtained 10 percent and 13 percent earnings premiums. Further analysis by detailed field of study showed that men and women who qualified in business and management and women who qualified in teacher education improved their relative earnings by 11–12 percent. Diplomas in other fields were associated with no improvement or reductions in relative earnings.

### **Further results**

An analysis of variations in the impacts of further education across different subgroups of students is helpful for understanding the main results.

### **Impacts of further study more positive for women than men**

The impacts experienced by women were on average more positive than those experienced by men, particularly at diploma level. This reflects the fact that women are more likely to increase their hours of work after undertaking the education. The earnings measure used in the EOTE analysis, average monthly earnings, is affected by changes in hours of work as well as changes in wage rates.

Although an increase in hours of work could be facilitated by a new qualification, it could also be pre-planned and independent of the qualification, making it more difficult to draw a causal link from the education to the improvement in earnings.

### **Benefits of further study mostly gained by students with relatively low monthly earnings before enrolment**

We grouped students by their level of monthly earnings before the study spell and found an inverse relationship between pre-study earnings and whether the further study was beneficial, for women at all levels of study and men at diploma level. Those with low average monthly earnings before they began studying had the largest improvements in relative earnings. Those with relatively high average monthly earnings before they began studying experienced a small earnings penalty on average.

One possible explanation for this pattern is that much of the beneficial impact of further education experienced by the lower-earning students came from increases in hours worked rather than wages, with those who were employed part time before they studied more likely to increase their hours. Another possible explanation lies in the effects of short-run earnings volatility on earnings growth patterns. Students whose earnings were temporarily low/high in the pre-study period may have experienced higher/lower earnings growth than average during the post-study observation period, moving them back towards their longer-term average earnings level.

### **Men with discontinuous employment patterns were much more likely to experience poorer outcomes than other men**

Significant earnings penalties were estimated for men who completed level 1–3 certificates and level 5–6 diplomas (see Table S1). These poorer results were driven by the outcomes of a minority of men who had significant breaks in their employment immediately before, during, or after the study period. Further education had no significant impact (positive or negative) on the earnings of men who were employed for most of the observation period.

### **Reasons for the limited benefits of further education**

#### **Students who completed certificates and diplomas were relatively well qualified beforehand**

The supplementary analysis of data from SoFIE showed that 60 percent of adults in the 25–64 age group who obtained a new certificate or diploma at levels 1–6 were already qualified at an equivalent or higher level. The fact that many

workers in this age group do not raise their overall educational level through their further study may help to explain the limited earnings benefits they obtain.

### **Average duration of study was fairly short**

The average duration of study associated with certificate and diploma qualifications is relatively short at around 1–1.5 years. In addition, some students in our sample were completing qualifications they had begun earlier but from which they had taken an extended break. This could help to explain the small impact of the qualifications on earnings growth, although we do not find a clear overall relationship between the number of effective full-time years of study (EFTS or study credits) that were undertaken and the impact of the qualification.

### **Robustness checks**

Prior educational attainment is an omitted variable in our main, EOTE-based analysis. We explored the implications of this omission in our analysis of data from SoFIE. Incorporating information on prior level of educational attainment within the impact models (so that students were being compared with similarly qualified non-students) did not alter our estimates of the impact of gaining a level 1–3 qualification, and slightly lowered our estimates of the impact of gaining a level 4–6 qualification. We conclude that the omission of education from the EOTE-based analysis probably did not lead to any substantial underestimation of the benefits.

In our analysis of data from SoFIE, we also compared the impact of gaining a qualification on different measures of earnings: hourly, weekly, and monthly. We found some significant differences, with qualifications at levels 4–6 leading to an increase in the weekly and monthly earnings of women but not an increase in their hourly earnings. This highlights the importance of assessing the impact of further education on wages rather than monthly or annual earnings.

### **Longer-run impacts**

It is possible that in some cases, certificate and diploma qualifications may have greater impact on students' earnings after more than three years have elapsed. The longer-run impacts could be investigated when more years of data are available in EOTE.

### **Conclusions**

This study examined the impact of further study at certificate and diploma level on the earnings of 25–64-year-old students, focusing on those with employment experience in the three years before their enrolment, who completed a qualification in 2003–2005. Only a small proportion of the students in this study population had improved their relative earnings by three years afterwards.

Women who completed a diploma improved their relative earnings, as did men who completed a diploma in engineering or business and management, women who completed a level 1–3 certificate in the society and culture field (mainly Te Reo Māori), and women who completed a level 4 certificate in the welfare field.

Qualifications gained in other fields of study or by other gender–age subgroups were associated with no improvement in relative earnings or relative earnings losses.

Research on the returns to level 1–4 qualifications gained through workplace-based industry training has also found no or only small benefits. Our failure to find evidence of more widespread earnings benefits is broadly consistent with the findings of research on post-school qualifications below degree level in Britain and Australia.





# 1 INTRODUCTION

This paper investigates the earnings benefits that are gained by working adults aged 25–64 who return to study at a tertiary institution and gain a certificate or diploma at levels 1–6. A growing number of adults aged 25 and over have been enrolling in tertiary education to gain new or additional qualifications. Ministry of Education statistics show that in 2009, for example, 15 percent of New Zealanders who were aged 25–39 and 6 percent of those aged 40 and over, studied with a tertiary education provider.<sup>4</sup>

Further education provides opportunities for adults to develop, broaden, or update their skills. If the additional skills they obtain are valued by employers, this should assist them to gain higher wages. Additional skills can also improve a student's employability or enable them to change their occupation or career. A change in occupation or career can have monetary benefits that are reflected in higher earnings, or it can simply result in non-monetary benefits such as higher job satisfaction.

Although there is little evidence on the motives of older students in New Zealand, it seems likely that a large proportion of students who return to tertiary education are motivated by the goal of improving their future employment opportunities. Davey (2002) reported that work-related factors ranked highly among the motives of a sample of students aged 40 and over who enrolled at Victoria University. More extensive evidence on the motives of mature students is available for other countries such as Britain. Davies et al (2002) found that employment factors were central to the decision making of mature students who had recently entered higher education in the United Kingdom. Among these students, the highest-ranking motive for enrolling was 'to enhance my career prospects'. About half gave a high ranking to the motive of 'improving my long-term financial situation'. More than 80 percent expected that the qualification they were studying for would prepare them for a new career/occupation or enhance their prospects in their existing career/occupation.

While further education can have different benefits for individuals, this study focuses on the question of whether students improve their earnings, because an increase in wages provides the clearest evidence that skills have been gained that are valued in the labour market. We use administrative data collected within the education system to identify those who studied for new qualifications and the specific qualifications gained, and administrative data derived from income tax returns to track their employment rates and monthly earnings before and after their period of study. These two types of administrative data (Ministry of Education enrolment and completion statistics and the Linked Employer–Employee Database (LEED) data) have recently been linked together through the Employment Outcomes of Tertiary Education (EOTE) project.

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<sup>4</sup> Ministry of Education participation rate estimates, based on enrolment data from tertiary providers and national population statistics, show that in 2009 5.1 percent of 25–39-year-olds were studying for a level 1–3 certificate, 2.4 percent for a level 4 certificate, 3.0 percent for a level 5–7 diploma, 3.1 percent for a bachelor's degree, and 2.5 percent for a higher qualification.

There has been little prior research on the benefits associated with lifelong education for working adults in New Zealand. Our study population comprises people aged 25–64 who enrolled at a tertiary institution in 2003–2005, completed a certificate or diploma at levels 1–6 by the end of 2005, did not undertake further tertiary study, and were employed in a wage or salaried job both before and after their study spell (for at least 6 months).

We focus on working adults who completed certificates and diplomas because most qualifications at this level can be completed within two years, allowing us to observe the employment and earnings of each student for at least three years before the study was begun and at least three years after completion.<sup>5</sup>

We estimate the impact of gaining a qualification on earnings by comparing the earnings growth experienced by the students in our study population with the earnings growth experienced by a comparison group of matched non-students, over the pre-study to post-study period. The paper examines the impact of further education on earnings rather than employment rates because earnings are measured more accurately than employment rates in EOTE, and we have much less information that could be used to construct a matched comparison group for students who were not employed.

The paper makes a number of contributions to the New Zealand literature on the labour market benefits of tertiary qualifications.

First, it is one of the first New Zealand studies to use longitudinal data, with observations on learners' employment and earnings before and after the period of study. Second, it constructs matched comparison groups to provide 'counterfactual' earnings growth scenarios against which the earnings of those who gained qualifications can be assessed. We match the students in our study population with comparison non-students using information on their demographic characteristics and employment and earnings profiles during the three years before the enrolment at a tertiary institution.

Third, we use a difference in differences approach to estimate the impact of the tertiary education, comparing the changes in the earnings growth of the study group members with the changes in the earnings growth of the comparison group members. This type of model is designed to isolate the effects of the education from the effects of other individual-specific variables that might be correlated with both earnings and educational qualifications, such as cognitive abilities or motivation. As long as such factors are constant over time, then their influence will be 'differenced out' and will not affect the estimate of the impact of further study.

The EOTE data has some significant limitations. In particular, it lacks information on individuals' pre-study educational attainment and it provides only one measure of earnings (total monthly earnings). To gain insights into the implications of those limitations for our main set of results, we undertake a parallel analysis of the research problem using data from the Survey of Families, Incomes and Employment (SoFIE), New Zealand's longitudinal household survey.

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<sup>5</sup> While a significant number of mature students completed a degree within the study period of 2003 to 2005, many degree candidates took longer than 3 years, and those who completed within 3 years may not be representative of wider group.

Unfortunately, there are insufficient students in the SoFIE sample to use this data source for the main analysis.

The paper is structured as follows. Section 2 summarises the findings of related research that has been conducted in New Zealand and elsewhere. Section 3 presents the data, methods and results from our main EOTE-based analysis. Section 4 outlines the data, methods and results from our supplementary analysis using SoFIE. Section 5 discusses the overall findings.

The results presented in this paper indicate that only a small proportion of the level 1–4 certificates that were completed by 25–64-year-old students who were already in the workforce led to improvements in their subsequent earnings growth. On average, qualifications at levels 5–6 (mostly diplomas) were associated with earnings benefits for women but not men. Disaggregating by field of study, we found that the impacts associated with diplomas were quite variable, with students in some fields experiencing significant benefits and students in other fields experiencing significant earnings penalties or no impact.

## 2 PREVIOUS RESEARCH

A small number of prior New Zealand studies of the labour market benefits of post-school qualifications have been undertaken, including Maani (1999), Maani and Maloney (2004), Maré and Liang (2006), and Scott (2009). Most of these studies have used cross-sectional rather than longitudinal data. For example, Maani and Maloney (2004) estimated the income and wage premiums associated with different levels of post-school qualification using cross-sectional data from the Income Survey for 1997 and 2003. Due to data coding limitations, all post-school qualifications below degree level were grouped together and labelled 'diplomas' in their analysis, which means the study was not able to identify differences in returns among certificate and diploma qualifications. Individuals with post-school qualifications below degree level were found to earn significantly more than individuals with no qualifications at all, but their average wage premium was similar in size to the wage premium earned by individuals with sixth form qualifications only. These estimates suggest that *on average* the labour market value of a post-school certificate or diploma is similar to the value of an upper school qualification.

Crichton (2009) and Scott (2009) are the only prior New Zealand studies to use longitudinal data. Scott (2009) analyses LEED and EOTE data on the annual earnings of young graduates who enrolled in tertiary education directly after school and completed a qualification in 2003. The outcome measures are annual earnings one year after the completion of the qualification and three years after completion. The impact of tertiary qualifications at level 4 and higher is assessed by comparing the earnings of students who completed these higher qualifications with the earnings of students who gained level 1–3 certificates only, in a regression framework with controls for the effects of other relevant characteristics such as age, gender, and industry of employment. The results show significant differences in the median incomes of recent graduates according to the level of the qualification obtained. Three years after completion, for example, level 5–6 diploma graduates earned 16 percent more than individuals with level 1–3 certificates, and level 4 graduates earned 4 percent more.<sup>6</sup> Examining the incomes of graduates by the main subject area of their qualification, Scott also finds large variations by field of study, which presumably reflect differences in the salaries of the jobs that are entered after graduation.

Crichton (2009) uses a different analytical approach to estimate the impact of gaining qualifications through workplace-based industry training on trainees' earnings and employment rates. Focusing on trainees aged 25–64 who completed qualifications at levels 1–4 through industry training during 2003–2005, Crichton compares the changes in the earnings of the trainees from before to after the qualification was gained, with the changes in earnings experienced by matched non-trainees over the same period. The results showed evidence of small increases in the average monthly earnings of some groups of trainees and no improvement in the earnings of others. Males who completed level 3 or level 4 certificates and females who completed level 4 certificates experienced

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<sup>6</sup> The study does not identify whether tertiary graduates earned more than young people who acquired only school qualifications, as people who did not do any tertiary study were not included.

earning benefits of 14percent, two years after completion. Females who completed qualifications at levels 1–3 and males who completed qualifications at levels 1–2 did not improve their earnings as a result of the training.

These prior New Zealand studies estimated the impact of education on earnings after taking certain individual characteristics into account, such as age and gender, but none included a wide range of control variables. Nor do these studies, with the exception of Crichton (2009), address the possibility that the association between educational qualifications and higher earnings is due in part to differences in the unmeasured characteristics of graduates and non-graduates.

The overseas evidence on the labour market benefits of post-school qualifications below degree level is mixed, with some studies in the literature finding few benefits and others finding benefits for many of the qualifications considered. The studies fall into two main groups: those using data from cross-sectional population surveys and those using longitudinal data. The first type compares the employment rates or wages of people who hold vocational qualifications with those of various comparison groups whose qualifications are lower (such as individuals with post-school qualifications at a lower level, those with school qualifications only, and those with no qualifications). Examples are Dearden et al (2002) and Jenkins et al (2007). The second type compares the *changes* in the labour market outcomes of people who gain additional vocational qualifications with the changes in the labour market outcomes of comparable people who did not do any further education.

Jenkins et al (2007) is a good example of the first type of approach. It examines the returns to intermediate vocational qualifications (National Vocational Qualification level 3 (NVQ3)) and lower vocational qualifications (NVQ2) in Britain for adults who do not have higher qualifications. It reports that the lower vocational qualifications do not provide positive wage premiums, although females with this level of qualifications do earn more than females with no other academic or vocational qualifications at all. In general, intermediate vocational qualifications provide a positive wage premium for people who left school at around 16 years with only a basic school qualification or less, but not for people with higher school qualifications. More detailed analysis by type of qualification suggests that *some* intermediate vocational qualifications are associated with wage benefits, but these are not apparent when all qualifications at that level are pooled.

A similar study was undertaken in Australia by Long and Shah (2008). Using cross-sectional data from the Australian Survey of Education and Training 2005, Long and Shah compare the total annual incomes of people who have completed vocational qualifications at three broad levels (levels 1–2, levels 3–4, and diplomas or advanced diplomas) with the incomes of people who have high school education only. They do not find statistically significant income effects for level 1–2 vocational qualifications, or for level 3–4 vocational qualifications obtained by females. However, they find positive income effects for qualifications at levels 3–4 obtained by males, and for diplomas and advanced diplomas for both genders. Long and Shah note that there are multiple pathways through which a given qualification can be obtained. Whether a particular qualification

has a significant marginal effect on the earnings of an individual may depend on what set of qualifications the individual already holds.

In the second group of studies, longitudinal survey data has been used to examine the benefits of gaining post-school qualifications later in life. Jenkins et al (2002), using data from the National Child Development Study, a birth cohort sample of people born in England in 1958, found very limited evidence that qualifications gained between the ages of 33 and 42 lead to wage benefits. Thirty-one percent of males and 37 percent of females in the sample acquired a vocational qualification between these two ages, although many of these qualifications were minor, such as specialised driver licences. Jenkins et al estimated first difference models to look at the association between acquiring qualifications and wage growth. Considering the sample as a whole, there was no robust evidence of an association between lifelong learning and higher earnings, indicating that people who had prior qualifications generally did not benefit. Considering only adults with no qualifications at the age of 33, however, there was some evidence that people who gained a qualification had faster earnings growth between 33 and 42 years. Undertaking further study was associated with a higher probability of being in employment at the age of 42, but the authors state they were not able to fully exclude the effects of endogenous factors that may have influenced both educational participation and the likelihood of employment.

Blanden et al (2008), using data for participants in the British Household Panel Survey, also failed to find strong evidence of earnings benefits for qualifications obtained at older ages. They defined lifelong learning as 'gaining formal educational qualifications after a period of at least two years in the labour market, following the first period of continuous education'. A fixed effects methodology was used to counter endogeneity bias, and lagged effects were estimated to identify how the returns from lifelong learning may evolve up to four years after the qualification is obtained. The results indicated that younger men (those aged under 35), and women aged 35–49 experienced small increases in their hourly earnings as a result of obtaining further qualifications, while other age and gender groups did not. The study was not able to examine the effects of different types or levels of qualification due to small sample sizes.

In another recent British study, De Coulon and Vignoles (2008) used longitudinal data from a more recent birth cohort study to examine the benefits of qualifications obtained at ages 26–34, and obtained more positive results than Jenkins et al (2002) and Blanden et al (2008). They compared the wage growth of study members who upgraded their qualifications between 1996 and 2004, with the wage growth of those who did not upgrade their qualifications. Elementary post-school vocational qualifications (NVQ1) were not associated with any discernable wage growth benefits. Basic vocational qualifications (NVQ2) were associated with a sizeable wage gain of around 20 percent for women, while the gains for men were smaller and not statistically significant. Intermediate vocational qualifications (NVQ3) and degrees acquired at ages 26–34 also led to significant wage gains for some gender and qualification-level groups but not others.

In the United States, Jacobson et al (2002) investigated the benefits of undertaking community college education for workers who were displaced from

their jobs. They used administrative data to identify both displaced workers and those who subsequently attended a community college for a period, regardless of whether or not a qualification was gained. Unlike the Australian and British studies, this study focuses on the effects of gaining credits for courses taken rather than the effects of completing a qualification. The average age of the displaced workers was 36. The most robust estimates from this study indicated that completing the equivalent of one full-time year of study raised quarterly earnings by 9 percent for men and 13 percent for women, in the long-term. However, only the more technically oriented vocational and academic courses were found to raise earnings; less technically oriented courses had low and possibly zero returns.

Summarising this literature, studies that use cross-sectional data sets and include people of all ages in their sample (from very recent graduates to those who obtained their qualification decades ago) have found that while qualifications at bachelor degree level or higher are typically associated with substantial wage premiums, this is not necessarily the case for qualifications below degree level. Higher sub-degree qualifications, such as two-year diplomas that are considered to require an 'intermediate' skill level, are more likely to be associated with discernable wage premiums than shorter qualifications that provide learning and certification at lower skill levels. In addition, it appears that the labour market benefits gained from a post-school qualification may vary across different types of student, depending on their existing level of educational attainment and other factors.

Studies that use longitudinal data and consider the slightly different question of whether employment and earnings benefits are gained by older adults who return to tertiary education have obtained conflicting results. These studies do not provide a clear answer to the question of whether further tertiary study is likely to be beneficial to participants or in what circumstances it is beneficial.

## **3 RESULTS USING EOTE**

### **3.1 Introduction**

This section presents the methods used and results obtained in our main analysis of the impact of gaining a qualification on earnings growth, using Employment Outcomes of Tertiary Education (EOTE) data. EOTE is a comprehensive data set containing the records of all people who have obtained a tertiary qualification since 1997, linked to information on their labour market outcomes. Because of its comprehensive coverage it supports research into the labour market outcomes associated with detailed types of tertiary qualification.

The EOTE data are described in section 3.2. The study design is outlined in section 3.3. Section 3.4 describes the characteristics of the study population and comparison group. The estimation models and results are presented in section 3.5.

### **3.2 Description of the data**

The EOTE data set was created by linking administrative data on participation and achievement in the publicly funded tertiary education system with administrative data on individuals' employment, earnings, and incomes. The latter data were derived from the Linked Employer–Employee Database (LEED). The EOTE data were created by Statistics New Zealand, the Ministry of Education, and the Department of Labour in a joint project in 2008/09.

The educational data used in this study includes details of all enrolments in formally assessed and publicly funded courses and qualifications that were taught by tertiary education providers between 1997 and 2008. The term 'tertiary education provider' covers universities, institutes of technology and polytechnics, colleges of education, wānanga, and private training establishments. Because of difficulties encountered in linking the educational data for 1997–2002 to LEED, however, a complete record of the tertiary sector learning of New Zealanders exists only for the years from 2003.

LEED incorporates longitudinal employment and income data for all individuals who are covered by the New Zealand tax system, together with information on the firms for which they work, for 1999–2009. This data set is the result of the linking of administrative data sources. Information on income is taken from employers' monthly Pay-As-You-Earn reports for all individuals who received wage and salary income and had income tax deducted. This is supplemented with annual information on income from self-employment, also obtained from tax returns. The LEED database also holds information on other forms of income such as income from income support benefits, accident compensation payments, paid parental leave, and student allowances. The age, gender, and geographic location of each individual in LEED are known. The records of individuals can be linked to information on their employers, which is taken from Statistics New Zealand's Business Frame. The data on firms include ownership relationships, industry, geographical location, and size.



LEED and the EOTE data sets do not include information on the hours worked by employees or their occupations. The absence of a measure of hours means an hourly wage rate cannot be constructed. The minimum unit of earnings that is recorded in LEED is the sum of earnings received by a worker during a calendar month. Ethnicity and high school qualifications are variables that are recorded in the tertiary education data but not in LEED, which means they are available only for people who have studied at a tertiary level since 2003, and cannot be used when constructing comparison groups of non-learners. No information on marital status or family relationships is available in LEED or EOTE.

Within the tertiary education data, level of study can be classified as:

- level 1–3 certificate
- level 4 certificate
- diploma (levels 5–6)
- bachelor’s degree (level 7)
- graduate certificates and diplomas (level 7)
- honours or postgraduate certificate or diploma (level 8)
- master’s degree (level 9)
- doctorate (level 10).

A level 1–3 certificate is equivalent to study at upper secondary school level. The majority of certificates at this level can be completed within one full-time year of study or less. A level 4 certificate requires skills at a higher level and may require one, two or perhaps three years of full-time study. Qualifications at levels 5–6 (which are typically diplomas, but include some qualifications labelled as certificates) also require one or two years of study to complete, but involve a higher level of skill than those at level 4. A small number of undergraduate diplomas take longer than two years and require a level of study that is equivalent to bachelor’s level (level 7). In the analysis in this paper, these undergraduate diplomas are grouped with the level 5–6 diplomas.

Bachelor’s degrees, graduate certificates and diplomas, honours and other postgraduate certificates and diplomas, master’s degrees, and doctorates are the remaining categories that can be separately identified.

The field of study classification identifies 12 broad fields of study, 70 narrow fields, and over 370 detailed fields. Reliable data on the main field of study is available only for those who completed a qualification.

For details of the EOTE feasibility project and the resulting data, see Statistics New Zealand (2009).

### **3.3 Study design**

This section describes the study population on which our analysis is based, the reasons we selected this study population, and the approach we used to define and select a suitable comparison group of non-students.

In brief, the study population was selected to ensure that all members undertook a minimum amount of study before completing a qualification, did not study

immediately before or after the reference spell (so that our measure of pre-to-post earnings growth is not affected by study-related hours of work reductions), and were employed for a minimum period before and after the reference study spell (so we can construct an earnings growth measure). The comparison group was constructed by individually case-matching each student with a similar non-student (and where possible up to five non-students), using information on age, gender, region, pre-study employment history, pre-study earnings, pre-study benefit receipt, and pre-study self-employment. The comparison group was matched to the study population by time period as well as personal characteristics.

### **3.3.1 Definition of the study population**

Our study population represents students who were successfully matched with LEED and gained a tertiary qualification while working or taking a break from work. It comprises those who began studying after 1 January 2003 and finished by 31 December 2005, and completed a qualification at levels 1–6 in the New Zealand Qualifications Framework during that period. We select those who were employed for at least six months during the three years before they enrolled in tertiary study and for at least six months during the third year after they completed their qualification. We refer to the education that was undertaken between 2003 and 2005 as the reference study spell.

In detail, the main study population comprises people who:

- could be matched to a record in LEED
- enrolled at a tertiary institution during 2003–2005 as a domestic student, after a gap of at least one year since their last spell of tertiary study.
- were aged 25–64 at the time they began their reference study spell
- ceased studying by December 2005 and had a gap of at least one year before starting another spell of tertiary study
- enrolled for courses comprising at least 0.25 of a full-time study year in total, during the reference study spell, and studied for at least 3 months<sup>7</sup>.
- completed at least one qualification at levels 1–6 during the reference study spell
- did not undertake any further tertiary study of significant duration (that is, no more than 3 months in total) in the three years after they completed their reference spell
- worked in a waged or salaried job for at least 6 months during the 6–36 months before the start of their reference study spell
- worked in a waged or salaried job for at least 6 months during the third year after the end of the reference study spell (that is, during months 25–36); this is our follow-up period.

Ninety-four percent of all domestic tertiary students were matched to a record or records in LEED, the source of the employment and earnings data. A similar proportion of domestic tertiary students in the 25–64 years age group

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<sup>7</sup> Very few students who enrolled for 0.25 effective full-time years of study (EFTS) or more studied for less than 3 months.

(93.5 percent) were matched with LEED. The other 6.5 percent were dropped from the analysis.

We focus on students who began an episode of tertiary study after January 2003 and finished by December 2005 because this ensures we have detailed information on their employment history and earnings in the three years before they began to study and for three years afterwards. Similarly, we focus on people who were aged at least 25 when they enrolled to ensure they were old enough to have had several years of full-time work experience before selection into our study population. There is a practical reason for the focus on people who returned to the education system rather than people who had never left it: we rely on information about pre-study work experience and earnings (along with demographic variables such as age, sex, and region) to match study population members in a meaningful way to 'comparable' individuals who did not study from 2003 onwards<sup>8</sup>.

We exclude people who were studying in the year immediately before the start of their reference spell. However, we do not exclude those who studied in the 2–3 years before the start of their reference study spell because we are unable to impose the same restriction on comparison group members. This is because the LEED records, our source of comparison group individuals, cannot be matched with records of educational attendance before 2003. In practice, as shown below, a sizeable minority of the study population members (23 percent) had been enrolled at a tertiary institution in the three years before the start of their reference study spell. Some of these individuals would have been enrolling for a new qualification in 2003–2005, while others would have been returning to complete a qualification they had started earlier but from which they had taken a break from. Those who *had* studied in the last three years had done so for an average of 10 months.

The minimum study workload threshold of 0.25 of a full-time study year (equivalent to 2–3 months of full-time study) serves to screen out people who enrolled for very short programmes or for just one or two part-time courses, as this level of education is unlikely to have substantive labour market impacts.

We restrict the study population to people who successfully completed a qualification by the end of 2005 because the information recorded on the number of credits earned and the main field of study is more accurate for completers than for non-completers. We exclude people who undertook any further education (for more than 3 months) in the three years following the reference study spell in order to examine students' labour market outcomes in a period when their employment was not constrained by further educational commitments.

We refer to the education that was undertaken between 2003 and 2005 as the reference study spell. We can identify the months in which a student was

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<sup>8</sup> The appendix provides a brief profile of all mature students and their study patterns and highlights the main ways in which mature students differ from younger students.

studying, and we permit breaks of up to 12 months within the reference spell.<sup>9</sup> Some students gained more than one qualification during the reference study spell. This was the case for 13 percent of those whose highest qualification gained was a level 1–3 certificate and 14 percent of those who gained a diploma. We focus on the highest qualification obtained in this period and its main subject area in our analysis of the impacts of different qualifications.<sup>10</sup> However, the study design means that for a small proportion of the students, we are estimating the labour market impacts of two or more qualifications.

### *Impact of the selection criteria*

Our selection criteria require that the study spell must have begun and ended within a specific three-year period (that is, 2003–2005) and a qualification must have been completed. As a result of these criteria our study population is biased towards students who completed a qualification within a relatively short period and excludes those who studied part time for many years.

It is important to be aware that only 42 percent of the students aged 25–64 who began a new study spell at tertiary institution during 2003 completed a qualification within three years. Half did not complete a qualification, and the remaining 8 percent took more than three years to do so.<sup>11</sup> However, students who enrolled for shorter qualifications were more likely to complete them within a three-year time horizon than those who enrolled for longer qualifications. Examining all mature students who enrolled in 2003, we found that 85 percent of all those who gained a level 1–3 certificate by the end of 2008 had finished studying and gained the qualification by the end of 2005. The comparable proportions for the students who completed level 4 qualifications and diplomas were 82 percent and 64 percent respectively.

The fact that students who enrolled in 2003 but took longer than three years to complete and students who enrolled in 2004 or 2005 but had not completed a qualification by the end of 2005 are excluded from our study population means that it is somewhat biased towards those who completed a qualification within a shorter than average time. We are unsure whether this is likely to significantly influence the results.

Table 3.1 provides information on the impact of the other selection criteria on the sample numbers. The first row of the table shows the total number of mature students with a study spell that began and ended between January 2003 and December 2005 who completed a level 1–6 qualification within that period (54,980). Forty-seven percent of the level 1–3 students, 18 percent of the

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<sup>9</sup> A student who stopped studying for a complete academic year will have a gap of at least 14 months in their study profile. Therefore, our definition means such students are treated as having separate study spells. If a student undertook two spells of study during 2003 to 2005 that were separated by more than 12 months, we select and analyse the second spell. Approximately 1 percent of students had two spells over the study period January 2003 to December 2005.

<sup>10</sup> If more than one qualification was gained at the same level of the national qualifications framework, we select the one with the highest workload.

<sup>11</sup> While apparently low, the 42 percent completion rate was only slightly below the qualification completion rate for students aged 15–19 years (45 percent) and slightly above that for students aged 20–24 years (40 percent).

level 4 students, and 12 percent of the level 5–6 students are excluded when we impose the minimum 0.25 effective full-time years of study (EFTS) requirement. Those excluded at this point will include people who were doing very short qualifications and people who were taking just one or two courses towards a larger qualification.

**Table 3.1:** Selection of the study population

| Step | Selection criteria  | Total  | Highest qualification gained |                     |         |
|------|---|--------|------------------------------|---------------------|---------|
|      |   |        | Level 1–3 certificate        | Level 4 certificate | Diploma |
| 1    | All mature students with a study spell that began and ended between January 2003 and December 2005, that resulted in a qualification being gained | 54,980 | 38,160                       | 11,670              | 5,150   |
| 2    | Enrolled for at least 0.25 EFTS over the study period and studied for at least 3 months   | 34,540 | 20,390                       | 9,620               | 4,530   |
| 3    | No significant further study in 3 years following reference spell completion (maximum of 3 months' further study)                                 | 28,100 | 16,650                       | 7,750               | 3,700   |
| 4    | In waged employment for at least 6 of the 7–36 months before the start of study spell   | 19,480 | 10,810                       | 5,830               | 2,840   |
| 5    | In waged employment for at least 6 of the 12 months in the follow-up period, 25–36 months after study ended                                       | 14,190 | 7,680                        | 4,360               | 2,150   |
| 6    | Case-matched to at least one comparable non-student   | 11,470 | 6,020                        | 3,650               | 1,800   |
|      | Percent lost between steps 1 and 2 (%)  | 37.2   | 46.6                         | 17.6                | 12.0    |
|      | Percent lost between steps 2 and 3 (%)  | 18.6   | 18.3                         | 19.4                | 18.3    |
|      | Percent lost between steps 3 and 4 (%)  | 30.7   | 35.1                         | 24.8                | 23.2    |
|      | Percent lost between steps 4 and 5 (%)  | 27.2   | 29.0                         | 25.2                | 24.3    |
|      | Final sample as a percent of all who gained a qualification (%)   | 25.8   | 20.1                         | 37.4                | 41.7    |
|      | Final sample as a percent of all who studied for at least 3 months and gained a qualification (%)   | 41.1   | 37.7                         | 45.3                | 47.5    |
|      | Final sample as a percent of all who met the educational criteria, before employment criteria were imposed (%)                                    | 50.5   | 46.1                         | 56.3                | 58.1    |

Note: EFTS = effective full-time years of study.

Significant numbers of students are also excluded because they re-enrolled at a tertiary institution in the three years after their reference study spell ended, or did not meet the pre-study and post-study employment criteria (working in a waged or salaried job for at least six months). Our final study population represents a minority of all mature students who completed a certificate or diploma during the period under consideration. It includes 20 percent of those who completed a level 1–3 certificate, 37 percent of those who completed a level 4 certificate, and 42 percent of those who completed a diploma. About half of the overall loss of sample members was due to the educational criteria and about half was due to the employment criteria.

### **3.3.2 Selecting the matched comparison group**

To calculate the effect of further education on students' subsequent labour market outcomes it is necessary to construct an estimate of what the students' employment or earnings would have been if they had not studied. Our overall approach is to match our study population to a random sample of employees who had similar observed characteristics and employment histories in the three years before 2003, but did not enrol in any tertiary education or government-funded industry training (of more than 3 months' duration) from 2003 to 2008. Where possible, each study population individual is matched with up to five individuals of the same age, gender, and region, with a matching profile for wage and salary employment and earnings, benefit receipt, and self-employment income profile in the three years before the study period began. The outcomes of the matched sample of non-students (the comparison group) are then compared with the outcomes of the matched students, using a regression framework. Regression models allow us to make further adjustments for differences between the study population and comparison group individuals that were not eliminated at the case-matching stage (such as differences in industry of employment).

To be selected for the comparison group sample, the non-students are required to have the same age and gender and the same or very similar number of months employed in waged or salaried jobs in the period 7–36 months before the study spell. In addition, the comparison group members are required to have average monthly earnings in the period 7–36 months before the study spell that are within 10 percent of those of the student they are matched to. We do not include the 6 months immediately before the start of study in the matching algorithm because of the possibility that people who are planning to return to the educational system may cease working somewhat before the start of the programme, either by choice or because their job ends and they do not consider it worthwhile to start another. They may also reduce their hours or change jobs to balance work and study commitments.

All matching is done with replacement, so a non-student can be matched to more than one student. If more than one potential match is identified, we randomly select up to five matches for each student.

**Table 3.2:** Pre-study characteristics of those who were matched and unmatched within the study population

| Characteristics  | Highest qualification gained |         |           |                     |         |           |         |         |           |
|--|------------------------------|---------|-----------|---------------------|---------|-----------|---------|---------|-----------|
|  | Level 1–3 certificate        |         |           | Level 4 certificate |         |           | Diploma |         |           |
|  | Total                        | Matched | Unmatched | Total               | Matched | Unmatched | Total   | Matched | Unmatched |
| Number of observations                                     | 7,700                        | 6,020   | 1,670     | 4,360               | 3,650   | 710       | 2,150   | 1,800   | 360       |
| Female (%)   | 62.7                         | 60.8    | 69.4      | 62.4                | 61.5    | 67.1      | 60.9    | 59.7    | 67.3      |
| Mean age (years)   | 38.7                         | 38.8    | 38.3      | 39.7                | 39.9    | 39.1      | 36.6    | 36.5    | 36.7      |
| Aged 25–34 (%)   | 37.6                         | 36.9    | 40.4      | 33.8                | 33.0    | 37.8      | 49.3    | 48.8    | 52.0      |
| Aged 35–44 (%)   | 35.0                         | 35.3    | 33.8      | 34.2                | 34.3    | 33.5      | 28.7    | 29.2    | 25.7      |
| Aged 45–54 (%)   | 21.4                         | 22.0    | 19.5      | 25.1                | 26.2    | 19.4      | 18.5    | 18.8    | 17.3      |
| Aged 55–64 (%)   | 6.0                          | 5.9     | 6.3       | 6.9                 | 6.5     | 9.3       | 3.5     | 3.2     | 5.0       |
| <b>Labour market indicators for 12 months before study</b> |                              |         |           |                     |         |           |         |         |           |
| Mean months employed                                       | 9.7                          | 10.3    | 7.4       | 10.4                | 10.9    | 8.1       | 10.2    | 10.6    | 8.2       |
| Mean monthly earnings (\$)                                 | 2,680                        | 2,950   | 1,710     | 3,270               | 3,470   | 2,250     | 3,270   | 3,450   | 2,340     |
| Mean months on benefit                                     | 2.7                          | 2.0     | 5.1       | 1.5                 | 1.0     | 4.0       | 1.3     | 0.9     | 3.0       |
| <b>Labour market indicators for 3 years before study</b>   |                              |         |           |                     |         |           |         |         |           |
| Employed every month (%)                                   | 38.8                         | 43.5    | 21.9      | 49.0                | 52.7    | 30.2      | 44.1    | 47.1    | 29.1      |
| Mean months employed                                       | 29.0                         | 30.5    | 23.5      | 30.8                | 31.9    | 24.8      | 30.2    | 31.2    | 25.4      |
| Mean monthly earnings (\$)                                 | 2,580                        | 2,820   | 1,740     | 3,170               | 3,340   | 2,280     | 3,150   | 3,300   | 2,400     |
| Received benefit income (%)                                | 42.9                         | 37.0    | 64.1      | 29.8                | 25.4    | 52.2      | 30.0    | 26.5    | 47.5      |
| Mean months on benefit                                     | 8.0                          | 6.3     | 14.2      | 4.6                 | 3.5     | 10.1      | 3.9     | 3.2     | 7.5       |
| Received self-employment income (%)                        | 16.3                         | 14.0    | 24.4      | 19.4                | 18.0    | 26.7      | 18.6    | 17.2    | 25.7      |
| Mean months self-employed                                  | 3.0                          | 2.5     | 4.7       | 3.6                 | 3.3     | 5.3       | 3.4     | 3.1     | 5.2       |

Eighty-two percent of individuals in the study population had at least one match to a comparable non-student, so were included in the final sample used in the analysis. The matched and non-matched study population members are compared in Table 3.2. Students with fewer months of employment before their enrolment and a higher level of recent benefit receipt were somewhat less likely to be matched to a comparable non-student, as were students with lower pre-study earnings. The matched students and the comparison group individuals are compared in section 3.4.2.

## **3.4 Sample characteristics**

### **3.4.1 Characteristics of the study population**

Table 3.3 presents summary information on the demographic characteristics of the study population members and the further education they undertook between 2003 and 2005. We focus on the students who were matched to comparison group individuals (that is, the sample used in the main analysis).

Around 60 percent of students were female. Their average age ranged from 37 for the diploma students to 40 for the level 4 certificate students. About 40 percent were aged 25–34, one-third aged 35–44, and the remaining one-quarter aged 45–64.

Level 1–4 certificates were mainly obtained at institutes of technology and polytechnics, wānanga, and private training establishments. Diplomas were well spread across the four main types of tertiary institution. The average duration of study was 12 months for level 1–3 certificates, 14 months for level 4 certificates, and 17 months for diplomas. About two-thirds of students studied on a full-time basis. The full-time/part-time split varied by qualification level, however. The full-time share was lowest among students who studied for level 1–3 certificates and highest among those who studied for level 4 certificates.

The average number of EFTS that students enrolled in over the study period ranged from 0.8 for the students who undertook level 1–3 certificates to 1.2 for the students who completed diplomas. The EFTS associated with the qualification gained was higher than the EFTS enrolled in over the study period. This suggests that some students may have been finishing qualifications that they had begun earlier. For example, 33 percent of those who gained a diploma enrolled in less than 1.0 EFTS during the study period.

On analysing study patterns in the three years the start of their reference study spell, we find that 16 percent of certificate students and 29 percent of diploma students had studied in the 13–36 months before the start of their reference study spell. (Recall that due to our selection criteria none studied during the 12 months beforehand.)

It is notable that both the average duration of study and the total number of EFTS that were enrolled in do not vary as much by the level of qualification as one might expect. This is at least in part due to the way in which the study population was selected. Our requirement that study spells started in or after January 2003 and ended by December 2005 means that a greater proportion of shorter study spells were selected.



**Table 3.3:** Characteristics of the study population, by highest qualification gained

| <b>Characteristics</b>   | <b>Level 1-3 certificate</b> | <b>Level 4 certificate</b> | <b>Diploma</b> |
|--|------------------------------|----------------------------|----------------|
| Number of observations   | 6,020                        | 3,650                      | 1,800          |
| Female (%)   | 60.8                         | 61.5                       | 59.7           |
| Mean age at start of study spell   | 38.8                         | 39.9                       | 36.5           |
| Males aged 25-34 (%)   | 18.9                         | 14.9                       | 25.8           |
| Males aged 35-44 (%)   | 10.9                         | 12.5                       | 8.9            |
| Males aged 45-64 (%)   | 9.4                          | 11.1                       | 6.7            |
| Females aged 25-34 (%)   | 22.0                         | 21.1                       | 27.6           |
| Females aged 35-44 (%)   | 20.4                         | 18.8                       | 16.8           |
| Females aged 45-64 (%)   | 18.4                         | 21.6                       | 15.3           |
| <b>Type of tertiary institution first enrolled in</b>                            |                              |                            |                |
| University (%)   | 2.6                          | 5.0                        | 20.8           |
| Polytechnic or technical institute (%)   | 45.1                         | 27.0                       | 37.7           |
| Wānanga (%)  | 27.4                         | 54.1                       | 12.2           |
| Private training establishment (%)   | 24.9                         | 13.9                       | 29.3           |
| <b>Study duration</b>  |                              |                            |                |
| Up to 6 months (%)   | 21.9                         | 12.9                       | 5.5            |
| 7-12 months (%)  | 46.5                         | 46.4                       | 34.9           |
| 13-24 months (%)   | 26.5                         | 32.6                       | 42.8           |
| 25-36 months (%)   | 5.1                          | 8.2                        | 16.8           |
| Study period (mean months)   | 12.0                         | 14.5                       | 17.2           |
| Mainly studied full time (%)   | 55.3                         | 76.0                       | 59.6           |
| Studied in 3 years prior (%)   | 15.6                         | 15.9                       | 28.8           |
| <b>Effective full-time years of study (EFTS) enrolled in during study period</b> |                              |                            |                |
| 0.25 to < 0.5  | 18.5                         | 10.9                       | 12.0           |
| 0.5 to < 1.0   | 46.9                         | 23.4                       | 22.8           |
| 1.0 to < 2.0   | 30.3                         | 45.1                       | 46.4           |
| 2.0 to < 3.0   | 3.7                          | 18.7                       | 16.1           |
| 3.0 to < 4.0   | 0.6                          | 1.7                        | 2.6            |
| 4.0+   | -                            | -                          | -              |
| Total less than 1.0 EFTS   | 65.4                         | 34.3                       | 34.8           |
| Average EFTS enrolled in   | 0.81                         | 1.13                       | 1.16           |
| <b>EFTS associated with highest qualification gained</b>                         |                              |                            |                |
| 0.1 to < 0.25  | 10.4                         | 3.0                        | -              |
| 0.25 to < 0.5  | 14.2                         | 12.0                       | 7.2            |
| 0.5 to < 1.0   | 51.4                         | 13.6                       | 20.1           |
| 1.0 to < 2.0   | 23.7                         | 33.6                       | 48.3           |
| 2.0 to < 3.0   | 0.3                          | 37.3                       | 17.7           |
| 3.0 to < 4.0   | -                            | 0.5                        | 5.9            |
| 4.0+   | -                            | -                          | -              |
| Percentage less than 1.0 EFTS  | 76.0                         | 28.6                       | 28.0           |
| Average EFTS   | 0.60                         | 1.23                       | 1.20           |

| <b>Characteristics</b>                | <b>Level 1–3 certificate</b> | <b>Level 4 certificate</b> | <b>Diploma</b> |
|---------------------------------------|------------------------------|----------------------------|----------------|
| <b>Field of study</b>                 |                              |                            |                |
| Science                               | 0.3                          | 0.2                        | 1.3            |
| Information technology                | 4.9                          | 0.5                        | 8.6            |
| Engineering                           | 6.5                          | 1.3                        | 5.2            |
| Architecture & building               | 1.4                          | 2.8                        | 1.9            |
| Agriculture & environment             | 6.4                          | 3.1                        | -              |
| Health                                | 6.8                          | 8.2                        | 8.6            |
| Education                             | 3.2                          | 4.3                        | 26.4           |
| Commerce                              | 28.6                         | 26.7                       | 11.4           |
| Society & culture                     | 14.3                         | 44.6                       | 18.2           |
| Creative arts                         | 2.1                          | 3.6                        | 12.4           |
| Food, hospitality & personal services | 4.0                          | 3.7                        | 4.7            |
| Employment and social                 | 21.5                         | 1.2                        | -              |

### *Characteristics by field of study and qualification*

Information on the profile of the students at each level of qualification and subject field is helpful for interpreting the results presented later in the paper. Table 3.4 shows the age and gender distribution, average pre-study earnings, employment history, benefit receipt, and average EFTS of students cross-tabulated by both level of qualification and major field of study. Some fields of study have quite distinctive student profiles. The engineering, architecture and building, and agriculture and environment subjects were predominately undertaken by males, while health and education qualifications were predominately undertaken by females. Qualifications in commerce, society and culture, creative arts, and in food, hospitality, and personal services had a mixture of female and male students, although at some levels they were female-dominated (such as diplomas in food, hospitality, and personal services).

Not surprisingly, there is a strong positive correlation between the level of the qualification and the average monthly earnings (prior to study) of the students who enrolled for it: diploma students earned considerably more before enrolment than certificate students. However, there are also significant variations across fields within the different levels of qualification in terms of the proportion of students with upper school qualifications, their prior benefit receipt patterns, their average number of months of employment before the study spell, and their average earnings.

Table 3.5 shows the extent to which students at the different levels of study were concentrated in particular fields. For level 1–3 certificates, three fields dominate: commerce (comprising mainly certificates in office studies or business and management), society and culture (comprising mainly certificates in human welfare services or language and literature), and the general (that is, non-vocational) employment and social skills field. These account for about two-thirds of all certificates. For level 4 certificates, the dominant fields are commerce and society and culture,<sup>12</sup> which together account for two-thirds of the certificates. Diploma students are more evenly spread across subject fields.

<sup>12</sup> These were mainly certificates in te reo Māori.

**Table 3.4:** Profile of the study population, by highest qualification gained and major field of study

| Highest qualification gained | Field of study                        | Gender by age        |                      |                      |                        |                        |                        | Female (%) | Average age | Percentage with higher secondary school qualifications | Average EFTS of qualification gained | Average no. of months on benefit during 36 months before study | Average no. of months employed during 36 months before study | Average monthly gross earnings in 36 months before study | N     |
|------------------------------|---------------------------------------|----------------------|----------------------|----------------------|------------------------|------------------------|------------------------|------------|-------------|--|--------------------------------------|--|--|--|-------|
|                              |                                       | Male 25-34 years (%) | Male 35-44 years (%) | Male 45-64 years (%) | Female 25-34 years (%) | Female 35-44 years (%) | Female 45-64 years (%) |            |             |  |                                      |  |  |  |       |
| Level 1-3 certificate        | Information technology                | 20                   | 11                   | 9                    | 19                     | 20                     | 19                     | 59         | 39          | 29   | 0.62                                 | 8.5  | 29.0   | 2,520  | 300   |
|                              | Engineering                           | 56                   | 20                   | 10                   | 7                      | 5                      | -                      | 14         | 34          | 35   | 0.60                                 | 4.6  | 30.2   | 3,220  | 390   |
|                              | Architecture & building               | 56                   | 17                   | 14                   | -                      | -                      | -                      | 13         | 34          | 21   | 0.78                                 | 6.0  | 30.6   | 2,950  | 90    |
|                              | Agriculture & environment             | 33                   | 15                   | 19                   | 15                     | 9                      | 8                      | 33         | 38          | 37   | 0.49                                 | 4.6  | 30.7   | 3,090  | 380   |
|                              | Health                                | 15                   | 12                   | 14                   | 21                     | 20                     | 17                     | 58         | 40          | 38   | 0.34                                 | 4.2  | 32.1   | 3,090  | 410   |
|                              | Education                             | -                    | -                    | -                    | 35                     | 28                     | 33                     | 96         | 40          | 46   | 0.52                                 | 8.6  | 28.4   | 2,045  | 190   |
|                              | Commerce                              | 13                   | 9                    | 9                    | 24                     | 24                     | 21                     | 69         | 39          | 36   | 0.59                                 | 5.9  | 31.1   | 2,920  | 1,720 |
|                              | Society & culture                     | 18                   | 10                   | 10                   | 17                     | 18                     | 26                     | 61         | 41          | 34   | 0.80                                 | 6.2  | 31.3   | 2,840  | 860   |
|                              | Creative arts                         | 30                   | -                    | -                    | 31                     | 15                     | 19                     | 65         | 35          | 52   | 0.65                                 | 5.2  | 29.6   | 2,740  | 130   |
|                              | Food, hospitality & personal services | 23                   | 10                   | 4                    | 30                     | 19                     | 14                     | 63         | 36          | 34   | 0.75                                 | 8.2  | 29.3   | 2,570  | 240   |
| Employment & social          | 10                                    | 11                   | 8                    | 26                   | 27                     | 18                     | 71                     | 39         | 46          | 0.51   | 7.4                                  | 29.8   | 2,600  | 1,300  |       |
| Total                        |                                       | 19                   | 11                   | 9                    | 22                     | 20                     | 18                     | 61         | 39          | 38   | 0.59                                 | 6.3  | 30.5   | 2,820  | 6,020 |
| Level 4 certificate          | Engineering                           | 60                   | -                    | -                    | -                      | -                      | -                      | 15         | 33          | 45   | 0.83                                 | 6.2  | 28.1   | 3,290  | 50    |
|                              | Architecture & building               | 57                   | 25                   | -                    | -                      | -                      | -                      | 10         | 33          | 32   | 1.03                                 | 3.1  | 29.9   | 3,200  | 100   |
|                              | Agriculture & environment             | 34                   | 17                   | -                    | 18                     | 12                     | 12                     | 41         | 36          | 47   | 0.92                                 | 4.8  | 30.2   | 3,030  | 110   |
|                              | Health                                | 9                    | 7                    | 10                   | 27                     | 21                     | 25                     | 74         | 40          | 47   | 0.55                                 | 3.7  | 32.2   | 3,140  | 300   |
|                              | Education                             | -                    | -                    | -                    | 20                     | 33                     | 38                     | 91         | 43          | 56   | 0.49                                 | 5.2  | 30.6   | 2,490  | 160   |
|                              | Commerce                              | 18                   | 14                   | 11                   | 24                     | 18                     | 16                     | 58         | 39          | 46   | 0.80                                 | 3.1  | 32.0   | 3,500  | 970   |
|                              | Society & culture                     | 10                   | 13                   | 15                   | 17                     | 19                     | 26                     | 62         | 42          | 42   | 1.80                                 | 3.1  | 32.6   | 3,460  | 1,630 |
|                              | Creative arts                         | 22                   | -                    | -                    | 37                     | 17                     | 17                     | 71         | 35          | 51   | 1.10                                 | 5.3  | 29.8   | 2,940  | 130   |
|                              | Food, hospitality & personal services | 10                   | -                    | -                    | 46                     | 24                     | 16                     | 86         | 35          | 49   | 0.82                                 | 4.4  | 29.9   | 2,830  | 130   |
|                              | Employment & social                   | -                    | -                    | -                    | -                      | -                      | -                      | 62         | 39          | 66   | 0.32                                 | 4.4  | 31.8   | 4,620  | 40    |
| Total                        |                                       | 15                   | 12                   | 11                   | 21                     | 19                     | 22                     | 62         | 40          | 45   | 1.23                                 | 3.5  | 31.9   | 3,340  | 3,650 |
| Diploma                      | Information technology                | 49                   | 17                   | -                    | 17                     | 8                      | -                      | 29         | 33          | 62   | 0.93                                 | 4.1  | 30.3   | 3,300  | 150   |
|                              | Engineering                           | 61                   | 21                   | -                    | -                      | -                      | -                      | 10         | 34          | 63   | 1.23                                 | 1.7  | 33.2   | 4,360  | 90    |
|                              | Health                                | 8                    | -                    | -                    | 39                     | 18                     | 27                     | 84         | 38          | 61   | 1.30                                 | 3.4  | 30.5   | 3,080  | 150   |
|                              | Education                             | 9                    | 6                    | 9                    | 28                     | 23                     | 25                     | 76         | 40          | 69   | 1.14                                 | 1.9  | 31.8   | 3,290  | 470   |
|                              | Commerce                              | 16                   | 11                   | 7                    | 36                     | 18                     | 12                     | 66         | 36          | 65   | 1.32                                 | 3.4  | 32.1   | 3,790  | 200   |
|                              | Society & culture                     | 30                   | 9                    | 9                    | 21                     | 17                     | 15                     | 53         | 37          | 62   | 1.23                                 | 3.6  | 31.9   | 3,190  | 330   |
|                              | Creative arts                         | 39                   | 9                    | -                    | 31                     | 10                     | 7                      | 48         | 33          | 74   | 1.18                                 | 4.3  | 29.4   | 3,080  | 220   |
|                              | Food, hospitality & personal services | -                    | -                    | -                    | 42                     | 32                     | -                      | 85         | 35          | 54   | 1.09                                 | 4.1  | 30.1   | 2,810  | 80    |
|                              | Total                                 |                      | 25                   | 9                    | 7                      | 28                     | 17                     | 15         | 60          | 37   | 65                                   | 1.20   | 3.2  | 31.2   | 3,300 |

Note: EFTS = effective full-time years of study.

**Table 3.5:** Profile of the study population, by highest qualification gained, age, and gender

|                                       | Level 1–3 certificates        |                               |                               |                                 |                                 |                                 | Level 4 certificates          |                               |                               |                                 |                                 |                                 | Diploma                       |                               |                               |                                 |                                 |                                 |
|---------------------------------------|-------------------------------|-------------------------------|-------------------------------|---------------------------------|---------------------------------|---------------------------------|-------------------------------|-------------------------------|-------------------------------|---------------------------------|---------------------------------|---------------------------------|-------------------------------|-------------------------------|-------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                       | Male<br>25–34<br>years<br>(%) | Male<br>35–44<br>years<br>(%) | Male<br>45–64<br>years<br>(%) | Female<br>25–34<br>years<br>(%) | Female<br>35–44<br>years<br>(%) | Female<br>45–64<br>years<br>(%) | Male<br>25–34<br>years<br>(%) | Male<br>35–44<br>years<br>(%) | Male<br>45–64<br>years<br>(%) | Female<br>25–34<br>years<br>(%) | Female<br>35–44<br>years<br>(%) | Female<br>45–64<br>years<br>(%) | Male<br>25–34<br>years<br>(%) | Male<br>35–44<br>years<br>(%) | Male<br>45–64<br>years<br>(%) | Female<br>25–34<br>years<br>(%) | Female<br>35–44<br>years<br>(%) | Female<br>45–64<br>years<br>(%) |
| <b>Field of study</b>                 |                               |                               |                               |                                 |                                 |                                 |                               |                               |                               |                                 |                                 |                                 |                               |                               |                               |                                 |                                 |                                 |
| Science                               | -                             | -                             | -                             | -                               | -                               | -                               | -                             | -                             | -                             | -                               | -                               | -                               | -                             | -                             | -                             | -                               | -                               | -                               |
| Information technology                | 5                             | 6                             | 5                             | 4                               | 5                               | 5                               | -                             | -                             | -                             | -                               | -                               | -                               | 18                            | 15                            | 7                             | 5                               | 4                               | -                               |
| Engineering                           | 19                            | 12                            | 7                             | 2                               | 2                               | -                               | 6                             | 2                             | -                             | -                               | -                               | -                               | 13                            | 13                            | 7                             | -                               | -                               | -                               |
| Architecture & building               | 5                             | 2                             | 2                             | -                               | -                               | -                               | 12                            | 5                             | -                             | -                               | -                               | -                               | 3                             | -                             | -                             | -                               | -                               | -                               |
| Agriculture & environment             | 11                            | 9                             | 13                            | 5                               | 3                               | 3                               | 7                             | 4                             | -                             | 3                               | 2                               | 2                               | -                             | -                             | -                             | -                               | -                               | -                               |
| Health                                | 5                             | 8                             | 10                            | 7                               | 6                               | 6                               | 5                             | 5                             | 7                             | 11                              | 9                               | 10                              | -                             | -                             | -                             | 12                              | 10                              | 15                              |
| Education                             | -                             | -                             | -                             | 5                               | 4                               | 6                               | -                             | -                             | -                             | 4                               | 8                               | 7                               | 9                             | 17                            | 36                            | 27                              | 35                              | 44                              |
| Commerce                              | 21                            | 23                            | 26                            | 31                              | 33                              | 33                              | 31                            | 30                            | 27                            | 31                              | 25                              | 20                              | 7                             | 15                            | 13                            | 14                              | 13                              | 9                               |
| Society & culture                     | 14                            | 14                            | 16                            | 11                              | 12                              | 20                              | 29                            | 48                            | 59                            | 34                              | 45                              | 54                              | 22                            | 18                            | 24                            | 14                              | 18                              | 18                              |
| Creative arts                         | 3                             | -                             | -                             | 3                               | 2                               | 2                               | 6                             | -                             | -                             | 6                               | 4                               | 3                               | 21                            | 11                            | 7                             | 15                              | 7                               | 6                               |
| Food, hospitality & personal services | 5                             | 3                             | 2                             | 5                               | 4                               | 3                               | 3                             | -                             | -                             | 8                               | 5                               | 3                               | -                             | -                             | -                             | 7                               | 9                               | -                               |
| Employment & social                   | 11                            | 22                            | 19                            | 25                              | 28                              | 21                              | -                             | -                             | -                             | -                               | -                               | -                               | -                             | -                             | -                             | -                               | -                               | -                               |
| <b>Prior earnings</b>                 |                               |                               |                               |                                 |                                 |                                 |                               |                               |                               |                                 |                                 |                                 |                               |                               |                               |                                 |                                 |                                 |
| < \$1,000                             | -                             | 2                             | 2                             | 17                              | 20                              | 13                              | -                             | -                             | -                             | 8                               | 15                              | 8                               | 2                             | -                             | -                             | 8                               | 11                              | 7                               |
| \$1,000 to < \$2,000                  | 14                            | 9                             | 6                             | 28                              | 31                              | 28                              | 9                             | 4                             | 5                             | 20                              | 25                              | 18                              | 9                             | 4                             | 8                             | 16                              | 25                              | 15                              |
| \$2,000 to < \$3,000                  | 38                            | 21                            | 21                            | 29                              | 25                              | 26                              | 30                            | 16                            | 14                            | 30                              | 23                              | 25                              | 31                            | 18                            | 18                            | 32                              | 24                              | 23                              |
| \$3,000 to < \$4,000                  | 29                            | 31                            | 29                            | 17                              | 14                              | 19                              | 32                            | 26                            | 22                            | 28                              | 21                              | 23                              | 32                            | 24                            | 21                            | 25                              | 18                              | 29                              |
| ≥ \$4,000                             | 18                            | 37                            | 42                            | 9                               | 10                              | 14                              | 28                            | 54                            | 59                            | 14                              | 15                              | 26                              | 26                            | 55                            | 53                            | 19                              | 22                              | 27                              |
| Average prior monthly earnings        | 3,080                         | 3,790                         | 3,920                         | 2,300                           | 2,200                           | 2,540                           | 3,430                         | 4,330                         | 4,650                         | 2,740                           | 2,570                           | 3,120                           | 3,300                         | 4,410                         | 4,350                         | 2,850                           | 2,740                           | 3,250                           |
| N                                     | 1,050                         | 750                           | 570                           | 1,180                           | 1,380                           | 1,110                           | 500                           | 500                           | 400                           | 700                             | 750                             | 790                             | 410                           | 190                           | 120                           | 460                             | 330                             | 270                             |

### **3.4.2 Labour market histories of study population and matched comparison group**

Table 3.6 gives descriptive information on the pre-study and post-study labour market and benefit receipt histories of the study population and comparison group individuals.

On average, the students had worked for 10–11 months of the year before their enrolment and for 30–31 months of the three years before enrolment. Around half had been employed in every month of the three years before the start of the study spell. Average monthly earnings in the pre-study year ranged from \$2,950 for the students who obtained level 1–3 certificates to \$3,450 for the students who obtained diplomas. Around one-quarter to one-third of the students had received some benefit income during the three years before their enrolment. However, the average number of months of benefit income was not particularly high (6 months for level 1–3 certificate students and 3 months for diploma students). Around 15 percent of the students had received some income from self-employment during the three years before the start of the study spell.

The match criteria ensure a high level of similarity between the matched study population and the comparison group members on measured characteristics, employment rates, and levels of earnings in the 7–36 months before the start of the study spell. One difference is that the comparison group members were slightly more likely to have been employed in the previous 12 months and less likely to have received benefit income. This is largely a consequence of the fact we did not include the 6 months immediately before the start of the study spell in the matching algorithm. We excluded those 6 months because of the possibility that some people who return to the education system stop working a few months before they enrol, which temporarily reduces their employment and earnings.

The analysis of pre-study to post-study earnings growth in this paper focuses on earnings in the third year after the completion of the qualification (that is, months 25–36). The bottom panel of Table 3.6 shows that the study population and comparison group individuals had very similar levels of employment in the third year after completion. Their monthly earnings were also similar, although the level 1–3 certificate students had slightly lower average monthly earnings than the comparison group individuals and the diploma students had slightly higher average monthly earnings. The raw differences in log earnings growth over the pre-study to post-study period are -0.015 log points for level 1–3 certificates, -.005 log points for level 4 certificates, and 0.038 log points for level 5–6 diplomas.

Table 3.7 describes and compares the labour market histories of the men and women in the study population. It reveals that the women had somewhat less continuous employment patterns than the men, but the gender differences in employment continuity are not particularly large. Overall, about 70–80 percent of students were employed for at least 80 percent of the pre-study, study, and post-study observation period. Female students were more likely than male students to have received benefit income during the pre-study period. The average monthly earnings of the female students in each qualification group were substantially lower than those of male students, both before and after

study. Those large gender differences are likely to be due to the lower weekly hours worked by women as well as their lower average hourly earnings. Overall, about three-quarters of the students changed their main employer between the pre-study period and the third year after completion, and this proportion did not vary much by gender.

**Table 3.6:** Characteristics of study population and matched comparison group, by level of highest qualification gained

| Characteristics  | Level 1-3 certificate |         |       |        | Level 4 certificate |         |       |        | Diploma          |         |       |       |
|--|-----------------------|---------|-------|--------|---------------------|---------|-------|--------|------------------|---------|-------|-------|
|  | Study population      |         |       |        | Study population    |         |       |        | Study population |         |       |       |
|  | Males                 | Females | Total | Comp   | Males               | Females | Total | Comp   | Males            | Females | Total | Comp  |
| Number of observations   | 2,360                 | 3,660   | 6,020 | 20,080 | 1,400               | 2,250   | 3,650 | 12,760 | 720              | 1,070   | 1,800 | 6,170 |
| Female (%)   | 0.0                   | 100.0   | 60.8  | 60.8   | 0.0                 | 100.0   | 61.5  | 61.5   | 0.0              | 100.0   | 59.7  | 59.7  |
| Mean age at start of study spell   | 37.6                  | 39.7    | 38.8  | 38.8   | 39.2                | 40.3    | 39.9  | 39.9   | 35.1             | 37.5    | 36.5  | 36.5  |
| <b>Employment and earnings during 12 months before study</b>                 |                       |         |       |        |                     |         |       |        |                  |         |       |       |
| Mean months employed   | 10.5                  | 10.2    | 10.3  | 10.7   | 11.0                | 10.8    | 10.9  | 11.1   | 10.7             | 10.6    | 10.6  | 10.8  |
| Mean monthly earnings  | 3,680                 | 2,470   | 2,950 | 2,960  | 4,250               | 2,70    | 3,470 | 3,480  | 4,000            | 3,090   | 3,450 | 3,430 |
| <b>Employment and earnings during three years before study</b>               |                       |         |       |        |                     |         |       |        |                  |         |       |       |
| Employed every month (%)   | 51.0                  | 38.7    | 43.5  | 55.5   | 61.4                | 47.2    | 52.7  | 63.2   | 52.3             | 43.5    | 47.1  | 59.3  |
| Employed in at least 30 out of 36 months                                     | 74.1                  | 67.4    | 70.0  | 72.8   | 80.7                | 75.1    | 77.3  | 79.7   | 76.8             | 70.6    | 73.1  | 76.4  |
| Employed for 18–29 months  | 17.3                  | 21.9    | 20.1  | 17.8   | 13.1                | 17.7    | 15.9  | 13.8   | 16.4             | 20.2    | 18.7  | 15.5  |
| Employed for less than 18 months   | 8.6                   | 10.8    | 9.9   | 9.4    | 6.2                 | 7.2     | 6.8   | 6.5    | 6.8              | 9.2     | 8.2   | 8.1   |
| Mean months employed   | 31.3                  | 30.0    | 30.5  | 31.1   | 32.5                | 31.5    | 31.9  | 32.3   | 31.8             | 30.8    | 31.2  | 31.7  |
| Mean monthly earnings  | 3,530                 | 2,360   | 2,820 | 2,820  | 4,130               | 2,850   | 3,340 | 3,330  | 3,810            | 2,960   | 3,300 | 3,290 |
| <b>Benefit receipt and self-employment during three years prior to study</b> |                       |         |       |        |                     |         |       |        |                  |         |       |       |
| Received benefit income (%)  | 32.0                  | 40.1    | 37.0  | 29.3   | 21.7                | 27.7    | 25.4  | 19.0   | 26.8             | 26.2    | 26.5  | 19.7  |
| Mean months on benefit   | 3.9                   | 7.8     | 6.3   | 5.8    | 2.4                 | 4.3     | 3.5   | 3.2    | 2.4              | 3.7     | 3.2   | 2.8   |
| Mean months on benefit (if received any benefit)                             | 12.3                  | 19.5    | 17.1  | 19.8   | 11.1                | 15.4    | 14.0  | 16.8   | 9.0              | 14.3    | 12.1  | 14.4  |
| Received self-employment income (%)  | 14.7                  | 13.5    | 14.0  | 12.8   | 18.0                | 18.0    | 18.0  | 14.7   | 16.9             | 17.5    | 17.2  | 14.2  |
| Mean months self-employed  | 2.5                   | 2.6     | 2.5   | 2.5    | 3.1                 | 3.5     | 3.3   | 3.2    | 2.7              | 3.3     | 3.1   | 2.9   |
| <b>Employment during study spell</b>   |                       |         |       |        |                     |         |       |        |                  |         |       |       |
| Employed during reference study spell (%)                                    | 90.8                  | 90.4    | 90.6  | 95.5   | 96.4                | 93.0    | 94.3  | 96.8   | 90.1             | 92.7    | 91.6  | 96.5  |
| Fraction of time employed during the reference study spell (%)               | 76.9                  | 76.4    | 76.6  | 89.2   | 86.4                | 82.5    | 84.0  | 91.3   | 71.2             | 76.1    | 74.1  | 89.9  |

| Characteristics   | Level 1-3 certificate |         |        |       | Level 4 certificate |         |        |       | Diploma          |         |       |       |
|---|-----------------------|---------|--------|-------|---------------------|---------|--------|-------|------------------|---------|-------|-------|
|   | Study population      |         |        |       | Study population    |         |        |       | Study population |         |       |       |
|   | Males                 | Females | Total  | Comp  | Males               | Females | Total  | Comp  | Males            | Females | Total | Comp  |
| <b>Employment and earnings during third year after completion</b> |                       |         |        |       |                     |         |        |       |                  |         |       |       |
| Mean months employed  | 11.5                  | 11.4    | 11.4   | 11.4  | 11.5                | 11.4    | 11.5   | 11.6  | 11.6             | 11.4    | 11.5  | 11.5  |
| Mean monthly earnings   | 4,050                 | 2,900   | 3,350  | 3,400 | 4,650               | 3,330   | 3,840  | 3,840 | 4,480            | 3,670   | 4,000 | 3,920 |
| Change of employer since the pre-enrolment period                 | 70.7                  | 74.4    | 72.9   | 57.9  | 62.9                | 69.7    | 67.1   | 55.9  | 75.0             | 76.8    | 76.1  | 59.4  |
| <b>Employment during the full observation period</b>              |                       |         |        |       |                     |         |        |       |                  |         |       |       |
| Employed every month (%)  | 35.7                  | 26.1    | 29.8   | 40.8  | 47.5                | 31.9    | 37.9   | 47.6  | 33.7             | 25.8    | 29.0  | 42.8  |
| Employed at least 80 percent of months                            | 76.3                  | 71.3    | 73.3   | 79.5  | 82.8                | 79.1    | 80.5   | 84.6  | 72.7             | 71.8    | 72.1  | 81.6  |
| Employed at least 50 but less than 80 percent of months           | 20.3                  | 24.4    | 22.8   | 16.6  | 15.6                | 17.6    | 16.8   | 13.0  | 24.3             | 24.3    | 24.3  | 14.9  |
| Employed for less than 50 percent of months                       | 3.3                   | 4.3     | 4.0    | 3.9   | 1.6                 | 3.2     | 2.7    | 2.4   | 3.0              | 3.8     | 3.5   | 3.5   |
| <b>Dependent variables used in the regression analysis</b>        |                       |         |        |       |                     |         |        |       |                  |         |       |       |
| Log of average monthly earnings before study                      | 8.070                 | 7.561   | 7.764  | 7.758 | 8.223               | 7.772   | 7.953  | 7.945 | 8.144            | 7.828   | 7.955 | 7.950 |
| Log of average monthly earnings after study                       | 8.208                 | 7.807   | 7.968  | 7.978 | 8.361               | 7.947   | 8.111  | 8.107 | 8.312            | 8.080   | 8.173 | 8.129 |
| Change in log monthly earnings                                    | 0.139                 | 0.247   | 0.204  | 0.219 | 0.141               | 0.177   | 0.159  | 0.163 | 0.168            | 0.251   | 0.218 | 0.180 |
| <i>Difference in the change in log earnings</i>                   | -0.038                | 0.001   | -0.015 |       | 0.018               | -0.004  | -0.005 |       | -0.041           | 0.090   | 0.038 |       |

Note: Comp = comparison group.



**Table 3.7:** Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained, age, and gender, study population and matched comparison group

|                         | Level 1–3 certificate |       |                 | Level 4 certificate |       |                 | Diploma       |       |                 |
|-------------------------|-----------------------|-------|-----------------|---------------------|-------|-----------------|---------------|-------|-----------------|
|                         | Est                   | SE    | No. of students | Est                 | SE    | No. of students | Est           | SE    | No. of students |
| All                     | <b>-0.020</b>         | 0.007 | 6,020           | -0.009              | 0.008 | 3,650           | 0.019         | 0.012 | 1,790           |
| <b>Gender</b>           |                       |       |                 |                     |       |                 |               |       |                 |
| Males                   | <b>-0.042</b>         | 0.008 | 2,360           | <b>-0.018</b>       | 0.009 | 1,400           | <b>-0.059</b> | 0.015 | 720             |
| Females                 | -0.005                | 0.009 | 3,660           | -0.003              | 0.012 | 2,250           | <b>0.068</b>  | 0.018 | 1,070           |
| <b>Gender &amp; age</b> |                       |       |                 |                     |       |                 |               |       |                 |
| Males aged 25–34        | <b>-0.061</b>         | 0.012 | 1,050           | <b>-0.053</b>       | 0.018 | 500             | <b>-0.048</b> | 0.019 | 410             |
| Males aged 35–44        | <b>-0.033</b>         | 0.012 | 740             | -0.017              | 0.015 | 500             | -0.023        | 0.024 | 190             |
| Males aged 45–64        | -0.022                | 0.015 | 570             | 0.023               | 0.018 | 400             | <b>-0.127</b> | 0.032 | 120             |
| Females aged 25–34      | -0.027                | 0.018 | 1,180           | -0.017              | 0.024 | 700             | <b>0.071</b>  | 0.029 | 460             |
| Females aged 35–44      | -0.001                | 0.015 | 1,380           | -0.010              | 0.020 | 750             | <b>0.113</b>  | 0.030 | 330             |
| Females aged 45–64      | 0.012                 | 0.014 | 1,110           | 0.013               | 0.016 | 790             | 0.010         | 0.027 | 270             |

Note: Estimates in bold are statistically significant at the 5 percent level. Each estimate is based on a separate regression analysis. For example, the estimate for males aged 45–64, comes from a regression analysis of males aged 45–64 and their matched comparisons. The model contains a treatment dummy (which indicates whether the individual obtained an additional qualification or not) and a set of industry controls. No. of students refers to the number of students in the study population.

## **3.5 Regression estimates of the impact of gaining a qualification on earnings**

We begin our presentation of the results with a short graphical comparison of the pre-study and post-study employment and earnings of the study population and comparison group. We describe our regression models in section 3.5.2 and present the main set of results in section 3.5.3. Those main results give our estimates of the impact of gaining a qualification on earnings growth for all students at each level of qualification, and for subgroups defined by gender, age group, and main field of study.

In section 3.5.4 we consider whether the impacts of further study vary according to the pre-study earnings of the student, the EFTS load of their qualification, the number of EFTS they enrolled for, whether they ceased working at the time of returning to study, and whether they changed their employer.

The robustness of the main set of results is discussed and further analysed in section 3.5.5. We present additional results for students who completed higher qualifications and estimates of the impact of further education on employment rates in section 3.5.6.

### **3.5.1 Comparison of labour market outcomes pre- and post-study**

Figure 3.1 plots the employment rates of the study population and comparison group members, by the level of the qualification obtained, in the four years before and four years after the study spell. The left-hand graphs show outcomes relative to the start of the study spell. Month 0 represents the first month of study, while months 0 to +48 cover the study spell and months afterwards. The right-hand graphs show outcomes relative to the end of the study spell. Month 0 represents the final month of study and months +1 to +48 cover the four years following it. We have complete data for every sample member for the period -36 to +36. Outside that period, the outcomes shown use the available data for individuals who either began their study towards the end of the 2003–2005 period or finished it before the end of 2005.

The employment rates of the students show small declines in the months immediately before their enrolment and larger falls around the time the study spell begins. A large proportion of students (70–85 percent) continued to work while studying. The graphs indicate that students' employment rates recovered very quickly after the end of the study spell and converge towards the employment rates of the comparison group. For those who completed level 1–3 or level 4 certificates, for example, this recovery was completed around 3 months after the study spell ended, and subsequently there was little difference in the employment rates of the students and comparison individuals.

The fact that post-study employment rates peak in the period 25–36 months after the end of the study spell, for both the students and the comparison group, is due to our selection criteria. We require that everyone has at least 6 months of employment in this period.

**Figure 3.1:** Employment rates in the months before and after the study spell, by highest qualification gained

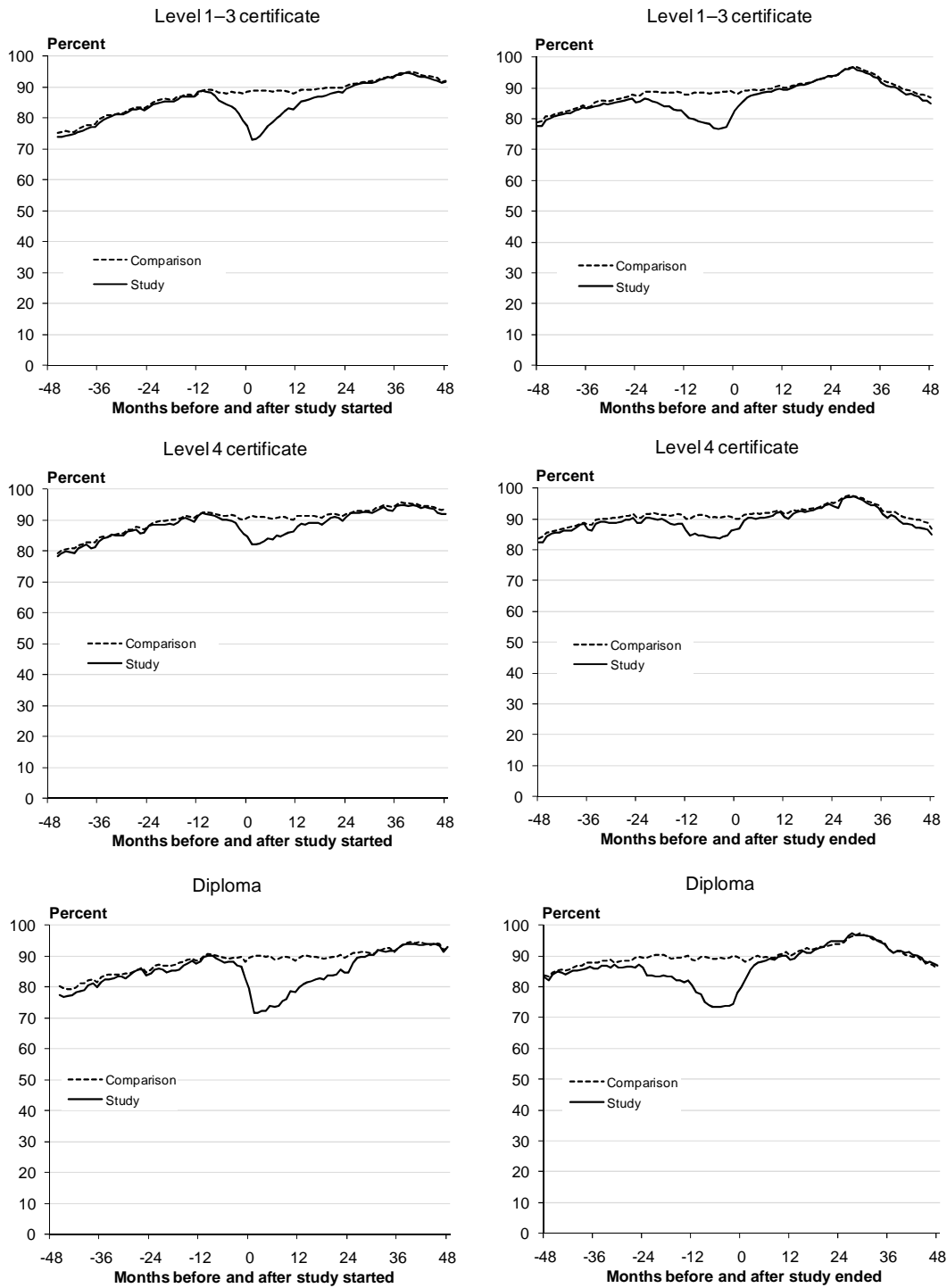
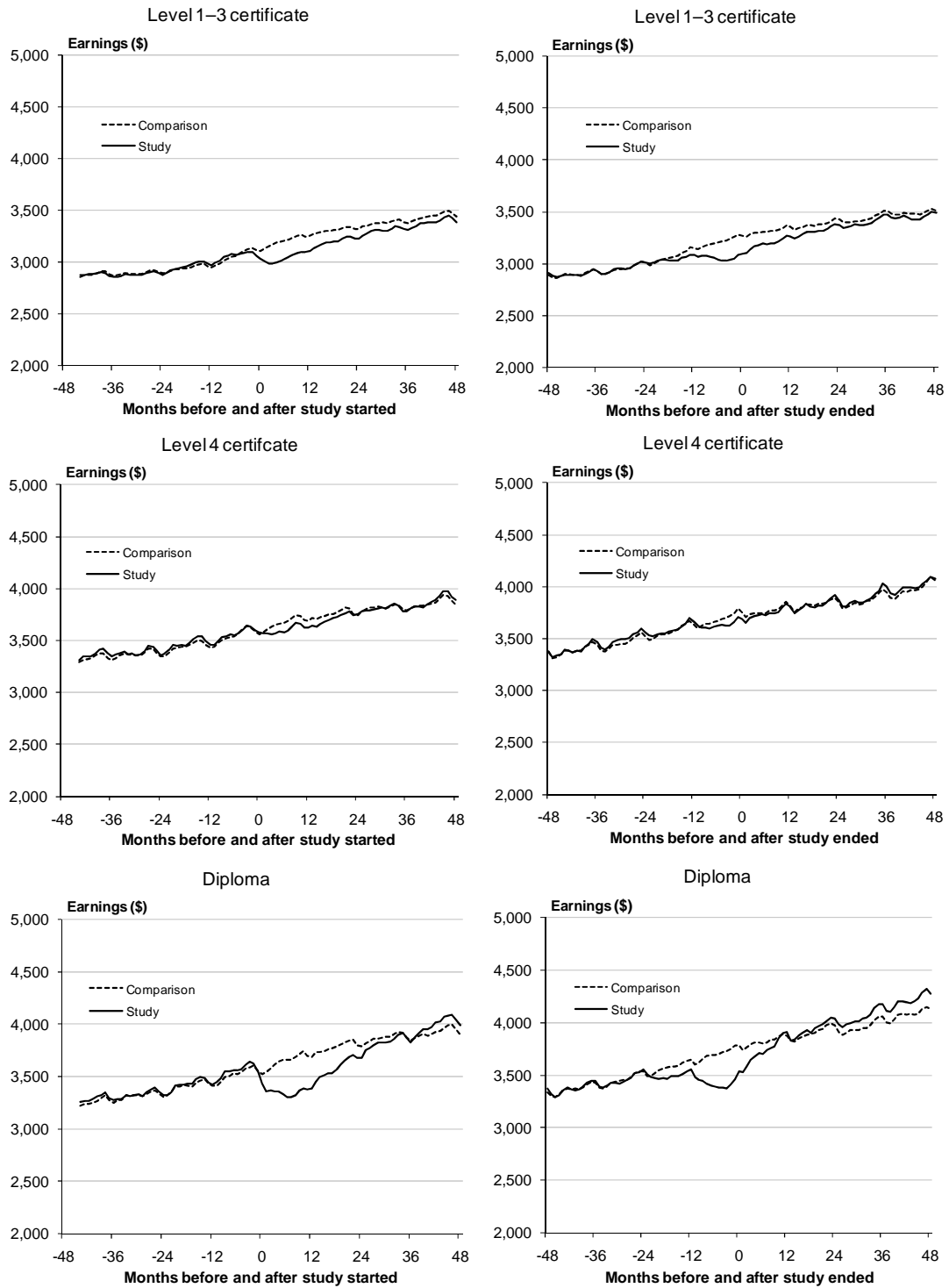


Figure 3.2 plots the average monthly earnings of study population and matched comparison group members, by the level of the qualification, in the four years before and after the study spell. People who were not working (and had zero earnings) in any given month are excluded from the average earnings calculations.

**Figure 3.2:** Average monthly earnings in the months before the study spell, by highest qualification gained



For students who gained level 1–3 certificates, average monthly earnings decreased relative to the earnings of the comparison group around the time study started, and began to increase again around the time the study spell ended. In the second and third year after the end of the study spell, the average monthly earnings of those who gained level 1–3 certificates were around 2 percent lower than those of the comparison group.

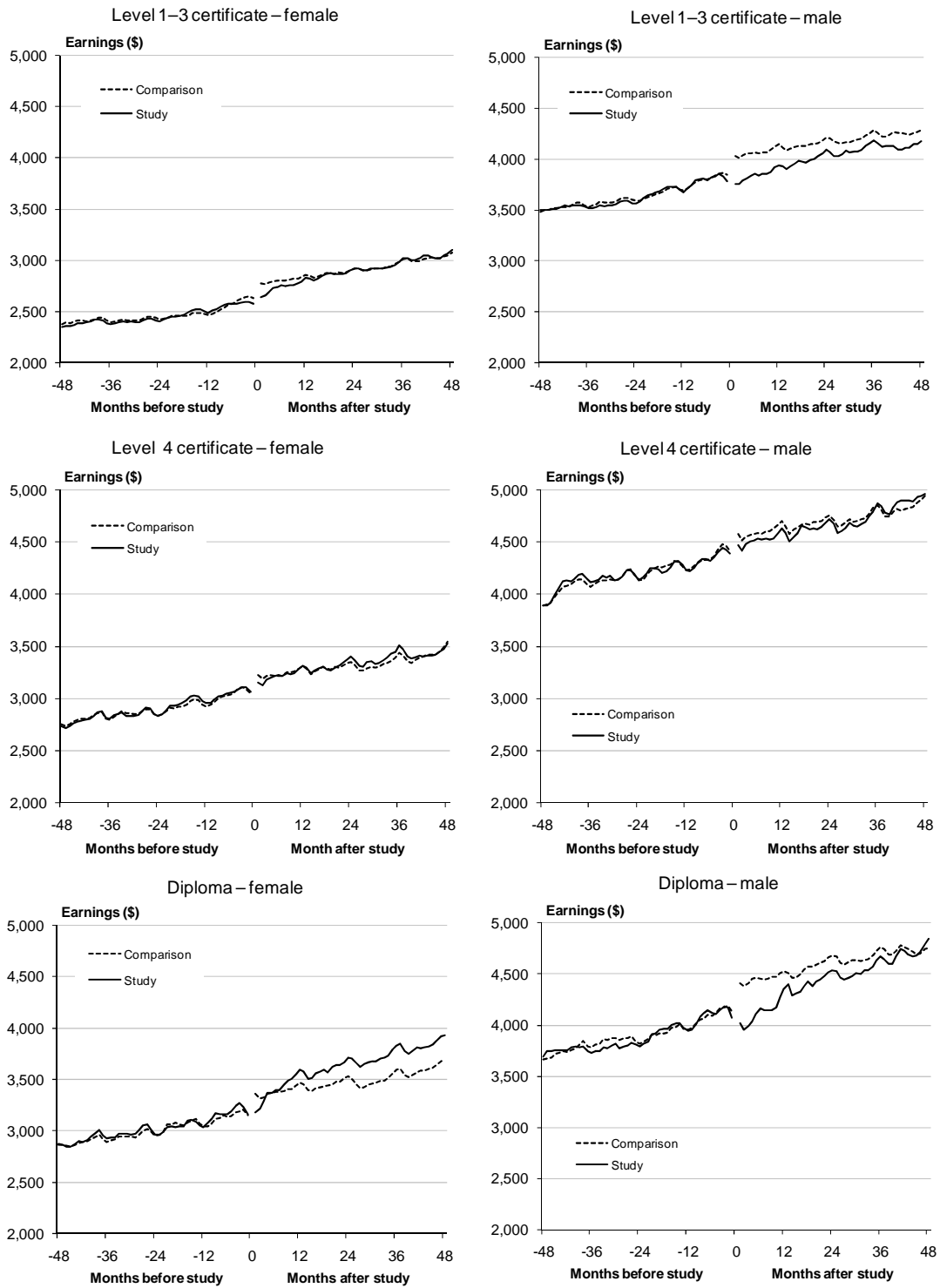
For students who gained level 4 certificates, average monthly earnings dropped slightly below those of the comparison group around 3–12 months after the study spell started. In the second year after the end of the study spell average monthly earnings were 1 percent lower, and they were the same in the third year afterwards.

For those who gained diplomas, average monthly earnings decreased quite markedly around the time study started, and remained lower during the study period. Average earnings were 1 percent higher than those in the comparison group in the second year after the study spell ended, and 2 percent higher in the third year.

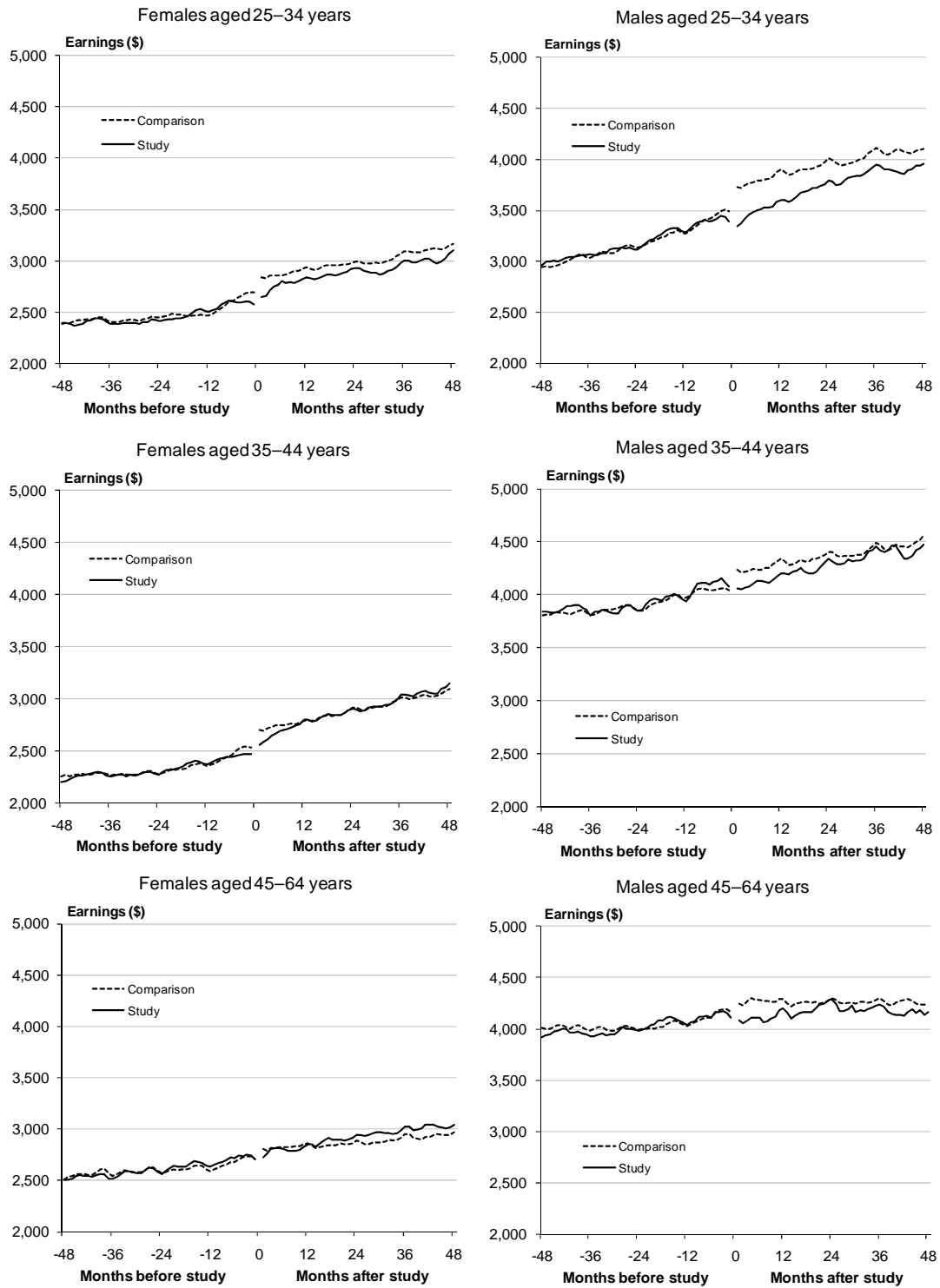
For a more detailed view of outcomes, Figures 3.3 and 3.4 plot the average monthly earnings of the study population and matched comparison group members, disaggregated by gender (Figure 3.3) and by gender and age group (Figure 3.4) as well as the level of the qualification. These figures indicate the average rate of earnings growth that was experienced by the students and matched non-students during the post-study period. Groups of students whose earnings were below those of the comparison group individuals during the third year after completion might attain higher earnings in the longer run if their earnings were growing at a faster rate and that faster earnings growth was maintained. There is some indication in Figure 3.3 that males who completed a diploma had faster earnings growth for at least four years afterwards, suggesting that an assessment of the earnings difference after five years might give a more positive result than an assessment after three years. However, this is an exceptional result. The graphs for level 1–3 and level 4 certificates, by gender and by gender and age group, do not indicate significant differences in earnings growth rates during the post-study period.

Taken together, the descriptive results presented in this section suggest that only female diploma students had significantly higher average monthly earnings than the matched non-students by the third year after the qualification was completed.

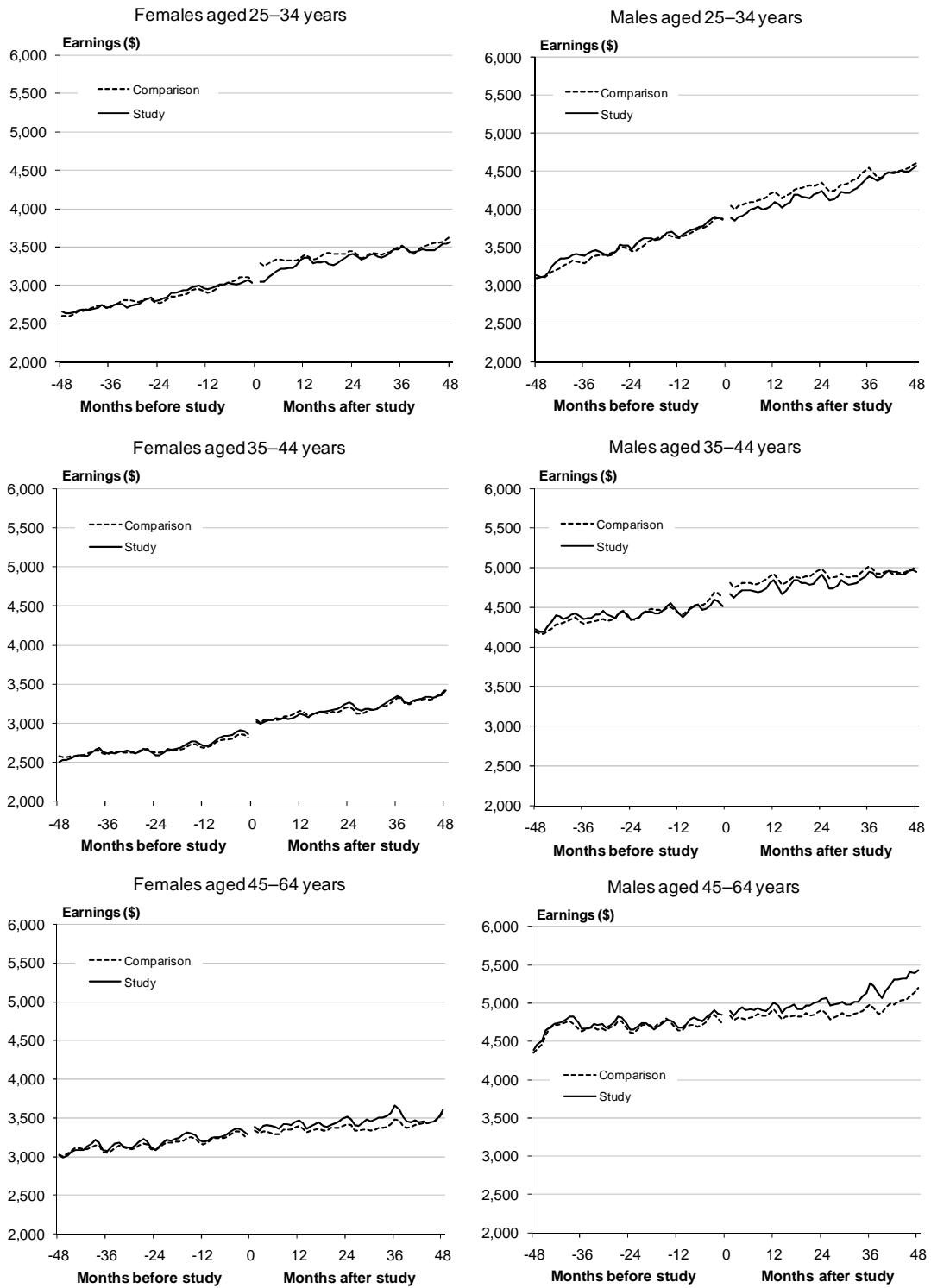
**Figure 3.3:** Average monthly earnings in the months before and after the study, by highest qualification gained and gender



**Figure 3.4:** Average monthly earnings in the months before and after study, level 1–3 certificates, by age and gender

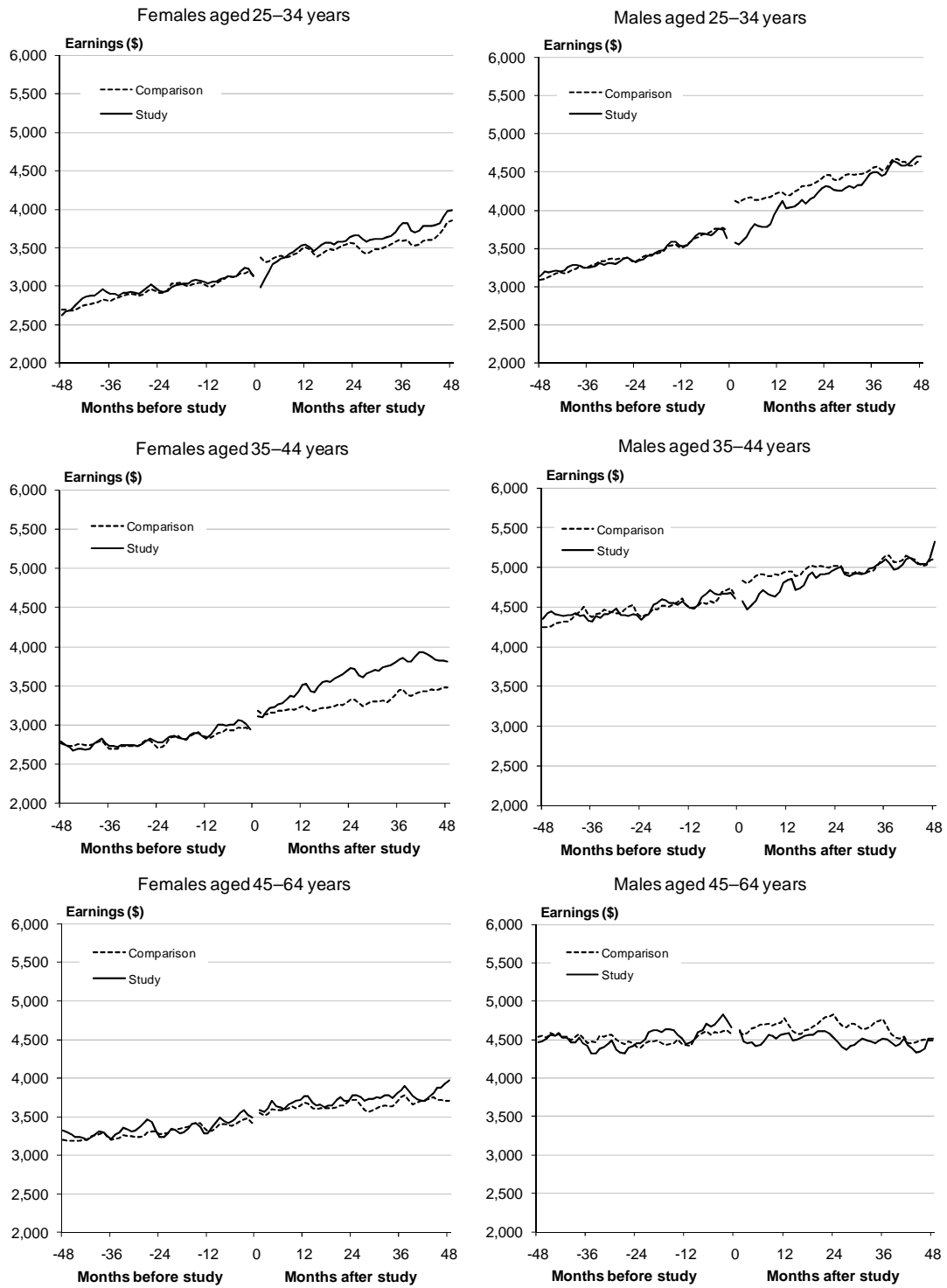


**Figure 3.4 continued:** Average monthly earnings in the months before and after study, level 4 certificate, by age and gender





**Figure 3.4 continued:** Average monthly earnings in the months before and after study, diploma, by age and gender



### 3.5.2 Regression estimates of the impact of gaining a qualification on future earnings

We now adopt a regression framework to estimate the impact of gaining a qualification on workers' future earnings growth, and examine whether the impact of gaining a qualification varies by the level of the qualification, age, gender, and the main field of study.

Our strategy is to regress our preferred measure of pre-study to post-study earnings growth on a set of control variables, including a dummy variable that indicates whether the individual obtained a post-school qualification. We identify the impact of the qualification as the average difference between the earnings growth of the study population individuals and that of the matched comparison group individuals. All our regression models are estimated separately for the three broad qualification levels (that is, levels 1–3, level 4, and levels 5–6).

The base regression model is:

$$\Delta Y_i = \alpha + \beta X_i + \delta T_i + \varepsilon_i$$

where the dependent variable is the change in the log of real average monthly earnings from before to after the study spell,  $X$  is a vector of variables describing individual characteristics before the study spell,  $T$  is an indicator of whether or not the individual obtained an additional qualification, and  $\delta$  is an overall 'treatment effect' coefficient that captures the difference in earnings growth between the study and comparison groups.

More specifically, the dependent variable is the percentage increase in the log of average monthly earnings from the first period (7–36 months before enrolment) to the second period (25–36 months after completion of the qualification). The vector of individual characteristics  $X$  includes information on the industry of employment before study for all individuals. Depending on the sample sizes that are available for the different regressions, we include 25–38 industry dummies, defined at the one- and two-digit industry level.

Controlling for industry of employment before study is important because industry-specific factors may lead to different earnings growth profiles, and we did not match the study and comparison group on industry of employment at the case selection stage. We do not control for differences in industry of employment after the qualification has been completed because the ability to move to an industry with higher earnings growth may be part of the 'return' that is gained from the education.

Age and gender are not included as control variables in the base regression model because the study population and comparison groups are almost perfectly matched on these characteristics at the case selection stage.

We then introduce interactions between  $T$  and other individual characteristics to estimate the treatment effect for different age and gender groups, different fields of study and so on. The extended model can be written as:

$$\Delta Y_i = \alpha + \beta X_i + \xi Z_i + \delta T_i Z_i + \varepsilon_i$$

Specifically, we include an indicator for gender, a set of age-group indicators, and a set of field of study indicators. We include three age-group dummy variables rather than modelling age as a continuous variable because we are interested in estimating average effects for these subgroups. We use indicators for the 12 broad fields of study defined in the official field of study classification in some regressions, while in others we include indicators for detailed field (where the sample size permits). We interact  $T$  with the gender, age group, and field of study indicators. This regression specification enables us to estimate the effects of gaining a qualification for a particular gender or age group while controlling for any differences between the groups in field of study. Similarly, we can identify the effects of gaining a qualification in a specific field of study, while controlling for the effects of any differences in the age and gender profiles of the students in the different fields. The parameters of interest are those associated with the interaction of  $T$  with age group, gender, and field of study (that is,  $\delta$ , which captures the difference in earnings growth between the study and comparison groups).

Table 3.7 presents the results obtained using the basic regression model, showing the impact of gaining a qualification for the entire study population, for each gender and for six age-gender groups. The main difference between these results and a simple comparison of the average log earnings growth of the study and comparison groups (as shown in Table 3.6) is that the effects of differences in industry of employment before study have been controlled for. However, the results are similar to those in Table 3.6.

Table 3.8 presents our preferred results for the six age-gender groups, which are obtained from the extended regression model that includes controls for differences in broad field of study. The three-way interaction term between  $T$  (the treatment indicator), field, and gender was significant in each case, and results are presented separately for males and females. Table 3.8 also gives results for each broad field of study, estimated with controls for differences in age profile.

Table 3.9 shows results for detailed fields of study, again estimated with controls for age group and gender.

These tables show the parameters of interest only, namely the interactions between the age-gender group and  $T$  (the treatment indicator) or between field of study and  $T$ .

**Table 3.8:** Regression estimates of the impact on gaining a qualification on the change in log earnings, by level of highest qualification gained, age, gender and broad field of study, study population and matched comparison group

|                                       | Level 1–3 certificate |       |                 |               |       |                 | Level 4 certificate |       |                 |               |       |                 | Diploma       |       |                 |              |       |                 |
|---------------------------------------|-----------------------|-------|-----------------|---------------|-------|-----------------|---------------------|-------|-----------------|---------------|-------|-----------------|---------------|-------|-----------------|--------------|-------|-----------------|
|                                       | Males                 |       |                 | Females       |       |                 | Males               |       |                 | Females       |       |                 | Males         |       |                 | Females      |       |                 |
|                                       | Est                   | SE    | No. of students | Est           | SE    | No. of students | Est                 | SE    | No. of students | Est           | SE    | No. of students | Est           | SE    | No. of students | Est          | SE    | No. of students |
| <b>All</b>                            | <b>-0.042</b>         | 0.008 | 2,360           | -0.005        | 0.009 | 3,660           | -0.018              | 0.010 | 1,400           | -0.003        | 0.012 | 2,250           | <b>-0.059</b> | 0.015 | 720             | <b>0.068</b> | 0.018 | 3,650           |
| <b>Age (years)</b>                    |                       |       |                 |               |       |                 |                     |       |                 |               |       |                 |               |       |                 |              |       |                 |
| 25–34                                 | <b>-0.062</b>         | 0.012 | 1,050           | -0.019        | 0.018 | 1,180           | <b>-0.041</b>       | 0.018 | 500             | -0.008        | 0.024 | 700             | <b>-0.044</b> | 0.019 | 410             | <b>0.071</b> | 0.029 | 460             |
| 35–44                                 | <b>-0.028</b>         | 0.012 | 740             | 0.000         | 0.015 | 1,380           | -0.008              | 0.015 | 500             | -0.008        | 0.020 | 750             | -0.040        | 0.024 | 190             | <b>0.110</b> | 0.030 | 330             |
| 45–64                                 | -0.025                | 0.015 | 570             | 0.006         | 0.014 | 1,110           | -0.005              | 0.018 | 400             | 0.006         | 0.016 | 790             | <b>-0.138</b> | 0.032 | 120             | -0.008       | 0.027 | 270             |
| <b>Major field of study</b>           |                       |       |                 |               |       |                 |                     |       |                 |               |       |                 |               |       |                 |              |       |                 |
| Science                               | s                     | s     | s               | s             | s     | s               | s                   | s     | s               | s             | s     | s               | s             | s     | s               | s            | s     | s               |
| Information technology                | <b>-0.091</b>         | 0.034 | 120             | 0.034         | 0.044 | 180             | s                   | s     | s               | s             | s     | s               | -0.040        | 0.036 | 110             | 0.108        | 0.085 | 40              |
| Engineering                           | 0.002                 | 0.021 | 340             | -0.024        | 0.079 | 50              | 0.018               | 0.053 | 40              | s             | s     | s               | <b>0.089</b>  | 0.042 | 80              | s            | s     | s               |
| Architecture & building               | 0.009                 | 0.044 | 80              | s             | s     | s               | 0.025               | 0.036 | 90              | s             | s     | s               | s             | s     | s               | s            | s     | s               |
| Agriculture & environment             | <b>-0.054</b>         | 0.024 | 260             | -0.027        | 0.052 | 130             | -0.038              | 0.042 | 70              | -0.056        | 0.075 | 50              | s             | s     | s               | s            | s     | s               |
| Health                                | -0.026                | 0.029 | 170             | 0.003         | 0.038 | 240             | -0.010              | 0.039 | 80              | 0.019         | 0.034 | 220             | s             | s     | s               | 0.026        | 0.049 | 130             |
| Education                             | s                     | s     | s               | <b>-0.195</b> | 0.043 | 190             | s                   | s     | s               | <b>-0.122</b> | 0.043 | 140             | -0.071        | 0.038 | 110             | <b>0.104</b> | 0.031 | 360             |
| Commerce                              | 0.001                 | 0.016 | 540             | 0.030         | 0.017 | 1,190           | 0.017               | 0.017 | 410             | -0.014        | 0.022 | 560             | 0.086         | 0.046 | 70              | <b>0.130</b> | 0.049 | 130             |
| Society & culture                     | <b>-0.051</b>         | 0.021 | 340             | <b>0.074</b>  | 0.026 | 520             | <b>-0.035</b>       | 0.014 | 620             | <b>0.040</b>  | 0.016 | 1010            | <b>-0.120</b> | 0.032 | 150             | 0.050        | 0.043 | 170             |
| Creative arts                         | <b>-0.133</b>         | 0.057 | 40              | -0.002        | 0.064 | 80              | <b>-0.117</b>       | 0.056 | 40              | <b>-0.138</b> | 0.053 | 90              | <b>-0.142</b> | 0.036 | 110             | 0.030        | 0.054 | 110             |
| Food, hospitality & personal services | <b>-0.194</b>         | 0.041 | 90              | <b>-0.165</b> | 0.048 | 150             | s                   | s     | s               | <b>-0.106</b> | 0.047 | 120             | s             | s     | s               | -0.122       | 0.066 | 70              |
| Employment & social                   | <b>-0.081</b>         | 0.019 | 380             | -0.032        | 0.019 | 920             | s                   | s     | s               | s             | s     | s               | s             | s     | s               | s            | s     | s               |

Notes: Regression controls for age and sex, field of study, and industry are included. Estimates in bold are statistically significant at the 5 percent level. No. of students refers to the number of students in the study population. Estimates based on fewer than 40 students have been suppressed (s).

**Table 3.9:** Regression estimates of the impact on gaining a qualification on the change in log monthly earnings, by level of highest qualification and detailed field of study, study population and matched comparison group

| Field of study                                   | Level 1–3 certificate |       |                 |               |       |                 | Level 4 certificate |       |                 |               |       |                 | Diploma |       |                 |              |       |                 |
|--|-----------------------|-------|-----------------|---------------|-------|-----------------|---------------------|-------|-----------------|---------------|-------|-----------------|---------|-------|-----------------|--------------|-------|-----------------|
|  | Males                 |       |                 | Females       |       |                 | Males               |       |                 | Females       |       |                 | Males   |       |                 | Females      |       |                 |
|  | Est                   | SE    | No. of students | Est           | SE    | No. of students | Est                 | SE    | No. of students | Est           | SE    | No. of students | Est     | SE    | No. of students | Est          | SE    | No. of students |
| Computer science                                 | <b>-0.140</b>         | 0.061 | 40              | 0.001         | 0.067 | 80              |                     |       |                 |               |       |                 | -0.029  |       | 70              |              |       |                 |
| Information systems                              | -0.106                | 0.056 | 40              | 0.052         | 0.088 | 40              |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Information technology‡                          | -0.020                | 0.062 | 40              | 0.071         | 0.078 | 60              |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Automotive engineering & technology              | 0.001                 | 0.034 | 130             |               |       |                 |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Mechanical & industrial engineering & technology | -0.039                | 0.041 | 90              |               |       |                 |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Electrical & electronic engineering & technology | 0.043                 | 0.051 | 50              |               |       |                 |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Building   | 0.009                 | 0.043 | 80              |               |       |                 | -0.046              | 0.036 | 90              |               |       |                 |         |       |                 |              |       |                 |
| Agriculture                                      | -0.005                | 0.040 | 90              | -0.020        | 0.082 | 50              |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Horticulture & viticulture                       |                       |       |                 |               |       |                 | -0.002              | 0.055 | 40              | -0.116        | 0.083 | 40              |         |       |                 |              |       |                 |
| Forestry studies                                 | <b>-0.096</b>         | 0.041 | 80              |               |       |                 |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Agriculture, environmental & related studies †   | 0.065                 | 0.053 | 50              |               |       |                 |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Nursing  |                       |       |                 | 0.041         | 0.073 | 60              |                     |       |                 | <b>0.177</b>  | 0.061 | 70              |         |       |                 |              |       |                 |
| Veterinary studies                               |                       |       |                 | 0.067         | 0.082 | 50              |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Public health                                    | -0.023                | 0.033 | 140             | 0.030         | 0.076 | 60              | 0.032               | 0.043 | 60              | <b>0.137</b>  | 0.068 | 60              |         |       |                 |              |       |                 |
| Health‡  |                       |       |                 |               |       |                 |                     |       |                 |               |       |                 |         |       |                 |              |       |                 |
| Teacher education                                |                       |       |                 | <b>-0.262</b> | 0.055 | 110             |                     |       |                 | -0.069        | 0.066 | 60              | -0.047  | 0.040 | 100             | <b>0.107</b> | 0.033 | 320             |
| Curriculum & education studies                   |                       |       |                 | -0.087        | 0.077 | 60              |                     |       |                 |               |       |                 |         |       |                 | 0.075        | 0.092 | 40              |
| Education †                                      |                       |       |                 |               |       |                 |                     |       |                 | <b>-0.160</b> | 0.058 | 80              |         |       |                 |              |       |                 |

| Field of study                   | Level 1–3 certificate |       |                 |               |       |                 | Level 4 certificate |       |                 |               |       |                 | Diploma       |       |                 |         |       |                 |
|----------------------------------|-----------------------|-------|-----------------|---------------|-------|-----------------|---------------------|-------|-----------------|---------------|-------|-----------------|---------------|-------|-----------------|---------|-------|-----------------|
|                                  | Males                 |       |                 | Females       |       |                 | Males               |       |                 | Females       |       |                 | Males         |       |                 | Females |       |                 |
|                                  | Est                   | SE    | No. of students | Est           | SE    | No. of students | Est                 | SE    | No. of students | Est           | SE    | No. of students | Est           | SE    | No. of students | Est     | SE    | No. of students |
| Business and management          | 0.050                 | 0.026 | 210             | 0.069         | 0.036 | 270             | -0.009              | 0.017 | 390             | <b>-0.071</b> | 0.024 | 440             | <b>0.119</b>  | 0.055 | 50              | 0.118   | 0.063 | 80              |
| Sales and marketing              |                       |       |                 | 0.080         | 0.064 | 80              |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Tourism                          |                       |       |                 | -0.080        | 0.071 | 70              |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Office studies                   | <b>-0.053</b>         | 0.025 | 220             | 0.014         | 0.022 | 730             |                     |       |                 | <b>0.223</b>  | 0.054 | 90              |               |       |                 |         |       |                 |
| Management & commerce ‡          | 0.027                 | 0.046 | 70              |               |       |                 |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Human welfare studies & services | -0.059                | 0.047 | 70              | <b>0.074</b>  | 0.034 | 300             |                     |       |                 | -0.032        | 0.047 | 120             |               |       |                 | 0.052   | 0.069 | 70              |
| Language & literature            | -0.057                | 0.046 | 70              | 0.028         | 0.059 | 100             | -0.008              | 0.015 | 540             | <b>0.051</b>  | 0.018 | 860             |               |       |                 |         |       |                 |
| Sport & recreation               | 0.003                 | 0.039 | 90              | <b>0.197</b>  | 0.095 | 40              |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Society & culture‡               | -0.095                | 0.046 | 70              | -0.051        | 0.092 | 40              |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Graphic & design studies         |                       |       |                 |               |       |                 |                     |       |                 |               |       |                 | <b>-0.149</b> | 0.057 | 40              | 0.011   | 0.085 | 40              |
| Visual arts & crafts             |                       |       |                 | 0.084         | 0.092 | 40              |                     |       |                 | -0.139        | 0.076 | 40              |               |       |                 |         |       |                 |
| Communication & media studies    |                       |       |                 |               |       |                 |                     |       |                 |               |       |                 | <b>-0.125</b> | 0.055 | 50              |         |       |                 |
| Food & hospitality               | <b>-0.192</b>         | 0.041 | 90              | <b>-0.188</b> | 0.064 | 80              |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Personal services                |                       |       |                 | -0.133        | 0.071 | 70              |                     |       |                 | -0.081        | 0.051 | 100             |               |       |                 | -0.112  | 0.071 | 60              |
| General education programmes     | <b>-0.209</b>         | 0.058 | 40              | <b>-0.166</b> | 0.070 | 70              |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Social skills programmes         | -0.053                | 0.030 | 160             | -0.029        | 0.039 | 220             |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |
| Employment skills programmes     | <b>-0.079</b>         | 0.029 | 170             | -0.021        | 0.023 | 620             |                     |       |                 |               |       |                 |               |       |                 |         |       |                 |

Notes: ‡ Not elsewhere classified, mixed, not further defined. Regression controls for age and sex, field of study and industry are included. Estimates in bold are statistically significant at the 5 percent level. No. of students refers to the number of students in the study population. Estimates based on fewer than 40 students have been suppressed (s).

### 3.5.3 Main results

#### *Impacts by level of qualification*

The results in Table 3.7 indicate that students who completed a level 1–3 certificate had lower earnings growth than the comparison group individuals during or after their study spell, with the result that their average monthly earnings were 2.0 percent lower in the third year after completion. Level 4 certificates were associated with a 0.9 percent earnings penalty, but this estimated impact was not statistically significant. Diplomas were associated with a 1.9 percent earnings premium (again not statistically significant).<sup>13</sup>

These overall mean effects conceal substantial variations in the size and direction of the impact of further study by gender, age, and field of study, as shown below. In the rest of this discussion we discuss only estimates that were significantly different from zero using the 95 percent confidence criterion.

#### *Age and gender variations*

There were substantial differences in the impacts for males and females and for different gender–age groups. The key results are shown in Table 3.8. On average, men who completed a level 1–3 certificate experienced earnings losses relative to the comparison group. The size of the estimated loss was largest for the youngest age group (25–34 years), at 7 percent. Men aged 35–44 and 45–64 experienced 3 percent and 2.5 percent losses respectively. Women who completed level 1–3 qualifications did not significantly improve or reduce their earnings compared with the comparison group, and this was true for all age groups.

For level 4 certificates, we estimate a 4 percent earnings penalty for men aged 25–34. The changes in the earnings of all other age and gender subgroups were not significantly different from those of their comparison groups.

Turning to diplomas, we estimate that the earnings of males decreased 6 percent on average while the earnings of females increased 7 percent. Men in all three age groups experienced significant reductions in their relative earnings. The estimated earnings penalty was largest for the oldest age group (45–64 years) at 14 percent. Men aged 35–44 and 45–64 experienced 4 percent losses. In contrast, women aged 25–34 and 35–44 experienced 7 percent and 11 percent increases in their relative earnings. Women aged 45–64 experienced a 1 percent increase in their relative earnings, which was not significant.

#### *Field of study variations*

The impacts of further education varied across graduates in different fields of study. In this section, we provide results for each of the major subject fields and

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<sup>13</sup> When estimated without industry controls, the average monthly earnings of those who gained level 1–3 certificates increased by 1.5 percent less than those of the comparison group, while the earnings of who gained level 4 certificates improved 0.4 percent less, and the earnings of those who gained a diploma improved by 3.8 percent more. Thus, the addition of industry controls had greatest impact on the estimates associated with gaining a diploma, reducing the overall effect from 3.8 percent to 1.9 percent and making this estimate statistically insignificant.

for detailed subject fields where at least 40 people in the study population gained a qualification at that level. Results based on fewer than 40 people are not included as they are considered unreliable. The results for broad field of study are in Table 3.8 and for detailed fields of study are in Table 3.9.

#### *Level 1–3 certificates*

Overall, level 1–3 certificates were not associated with improvements in the relative earnings of the students in our study population. Gaining a certificate at level 1–3 was also not followed by a significant improvement in the relative earnings of students in any broad field of study, with the exception of qualifications in society and culture gained by women.

The earnings of students who gained certificates in the food, hospitality and personal services field were significantly lower than those of the comparison group by the third year after completion, implying that studying for a qualification in this field was disadvantageous. Certificates in information technology, agriculture, society and culture, the creative arts for men, and education for women were also associated with a loss of relative earnings (of 5–20 percent). The impacts associated with all other broad fields of study were smaller and not significantly different from zero.

Results for detailed fields of study indicated that students who gained a certificate in business and management improved their relative earnings by 6 percent, and women who gained a certificate in human welfare studies and services improved their relative earnings by 7 percent. Students in all other fields had slower or similar earnings growth to the comparison group individuals.

#### *Level 4 certificates*

Students who completed a level 4 certificate did not improve their relative earnings on average. However, women who completed certificates in the society and culture field gained a 4 percent earnings premium, while women who completed certificates in the food, hospitality, and personal services; education; and creative arts fields experienced significant earnings losses (11–14 percent).

Analysis of impacts by detailed field of study showed that women who completed qualifications in office studies, nursing, public health, and language and literature<sup>14</sup> improved their earnings by 22 percent, 18 percent, 14 percent, and 5 percent respectively. Certificates in business and management were associated with relative earnings losses of 7 percent. The impacts for all other detailed fields of study that could be separately identified were not significantly different from zero.

Men who gained certificates in the broad fields of society and culture and the creative arts experienced lower earnings growth than the comparison group, and by the third year after completion their earnings were 4 percent and 12 percent lower respectively. Certificates in other broad fields of study did not have significant impacts on male earnings. The impacts for all detailed fields of study that could be separately identified were also not significantly different from zero.

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<sup>14</sup> These were mostly certificates in Te Reo Māori.



## *Diplomas*

The average impact of gaining a diploma differed markedly for male and females. The earnings of males decreased by 6 percent on average while the earnings of females increased by 7 percent. Disaggregating these impacts by field of study, we found substantial earnings gains in a few fields and no significant impact in others.

Men who completed diplomas in engineering experienced relative earnings gains of 9 percent, and women who completed diplomas in education and commerce experienced relative earnings gains of 10 percent and 13 percent respectively. Men who completed diplomas in society and culture or the creative arts experienced relative earnings losses of 12 percent and 14 percent respectively. Diplomas in other broad fields of study were not associated with significant earnings impacts.

Further analysis by detailed field of study showed that men and women who qualified in business and management and women who qualified in teacher education improved their relative earnings by 12 percent. The impacts estimated for all other detailed fields of study that were separately identified were not statistically significant.

### **3.5.4 Other variations in impacts**

#### *Pre-study earnings level*

At each level of qualification, employees with the lowest average monthly earnings before studying experienced the largest earnings gains (see Table 3.10). This is true for women at all levels of study and for men at diploma level, but not for men who completed certificates. For example, women who completed level 1–3 certificates and earned less than \$2,000 per month (gross, and evaluated in March 2007 dollar values) before they started studying experienced a 3 percent improvement in their monthly earnings relative to the comparison group. Women who earned between \$2,000 and \$3,999 per month experienced a 2 percent loss in relative earnings, while those who earned \$4,000 or more per month experienced a 7 percent loss. Only the last result is significant at the 95 percent level. This pattern also exists for women who completed level 4 certificates and diplomas. For example, women in the lowest earnings group who completed a diploma gained an 18 percent earnings premium, while women in the highest earnings group who completed a diploma did not benefit.

**Table 3.10:** Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained, gender and prior monthly earnings, study population and matched comparison group

|  | Level 1–3 certificate |       |              | Level 4 certificate |       |              | Diploma       |       |              |
|--|-----------------------|-------|--------------|---------------------|-------|--------------|---------------|-------|--------------|
|  | Est                   | SE    | No. students | Est.                | SE    | No. students | Est.          | SE    | No. students |
| <b>Gender</b>                            |                       |       |              |                     |       |              |               |       |              |
| Males                                    | <b>-0.042</b>         | 0.008 | 2,360        | <b>-0.018</b>       | 0.009 | 1,400        | <b>-0.059</b> | 0.015 | 720          |
| Females                                  | -0.005                | 0.009 | 3,660        | -0.003              | 0.012 | 2,250        | <b>0.068</b>  | 0.018 | 1,070        |
| <b>Gender and prior monthly earnings</b> |                       |       |              |                     |       |              |               |       |              |
| Males < \$2,000                          | -0.035                | 0.038 | 290          | -0.005              | 0.064 | 100          | -0.042        | 0.080 | 70           |
| Males \$2,000 to < \$3,000               | <b>-0.053</b>         | 0.014 | 670          | -0.012              | 0.022 | 280          | -0.031        | 0.028 | 180          |
| Males \$3,000 to < \$4,000               | <b>-0.034</b>         | 0.011 | 700          | -0.022              | 0.015 | 380          | <b>-0.052</b> | 0.020 | 200          |
| Males \$4,000 and over                   | <b>-0.048</b>         | 0.010 | 690          | <b>-0.028</b>       | 0.011 | 650          | <b>-0.093</b> | 0.016 | 280          |
| Females < \$2,000                        | 0.028                 | 0.016 | 1680         | 0.030               | 0.025 | 700          | <b>0.180</b>  | 0.039 | 290          |
| Females \$2,000 to < \$3,000             | -0.018                | 0.015 | 580          | 0.031               | 0.019 | 580          | <b>0.077</b>  | 0.027 | 290          |
| Females \$3,000 to < \$4,000             | -0.029                | 0.016 | 600          | <b>-0.044</b>       | 0.017 | 540          | 0.010         | 0.024 | 250          |
| Females \$4,000 and over                 | <b>-0.075</b>         | 0.018 | 410          | <b>-0.045</b>       | 0.018 | 410          | 0.005         | 0.024 | 230          |

Notes: Each estimate is based on a separate regression analysis. For example, the estimate for males earning less than \$2,000 per month comes from a regression analysis of these males and their matched comparison workers. The model contains a treatment dummy (which indicates whether or not the individual obtained an additional qualification) and a set of industry controls. Estimates in bold are statistically significant at the 5 percent level. No. of students refers to the number of students in the study population.

Monthly earnings are influenced by changes in employment regularity and hours of work as well as by changes in wage rates. One possible explanation is that the students were more likely than the matched non-students to change their hours of work in the post-study period, with some students in the lowest earnings quartile who were previously part-time employed increasing their hours and some students in the high-earnings quartile, who were previously full-time employed, reducing their hours. This explanation is consistent with the association between prior earnings level and subsequent earnings growth being much stronger for women than for men (given the fact that women are much more likely than men to work on a part-time basis for part of their adult working life). The fact that in our main results we consistently estimate larger positive impacts for women than for men may also indicate that hours of work changes are influencing the results.

#### *Effective full-time years of study associated with the qualification and study spell*

There was considerable variation among level 4 certificates and diplomas in EFTS load. There was also much variation across students in the number of EFTS that were enrolled for, with some students enrolling for quite low numbers of EFTS, suggesting they may have been finishing qualifications they had begun earlier.

We explored the relationship between the EFTS load associated with the qualification and the earnings benefits experienced, by stratifying the sample into subgroups with different numbers of EFTS. There was no clear relationship between EFTS load and the size of the impact on earnings. We also examined the relationship between the number of EFTS that the student enrolled in during the study spell and their outcomes. Again, there was no clear relationship with the size of the post-study earnings increases.

Overall, there was no consistent relationship between EFTS and post-study earnings gains among those who obtained level 1–4 certificates or diplomas.

#### *Whether ceased working while studying*

A large proportion of students worked while studying (70–80 percent were employed in any given month of study), and many of these students continued in jobs they held before studying. However, a significant minority took a break from employment or worked discontinuously. It seems likely that continuity of employment could affect earnings growth.

We considered whether the earnings benefits of gaining further qualifications varied according to the employment situation of the student during the period from six months before studying to two years afterwards (the interval between the two reference periods used to construct our measure of the impact of education on earnings). Figure 3.1 shows that about 90 percent of students were working at 6 months before they started studying. Employment rates declined in the months immediately before enrolment, with a larger fall occurring around the time the study spell began.

We began by identifying those who were *mainly working* in the six months before they started studying, during the study spell and during the two years afterwards. For simplicity, we refer to this period as the 'study and immediate

post-study interval'. About 47 percent of students were employed in all months of this interval and 74 percent were employed in at least 80 percent of the months. About 18 percent were employed for at least 50 percent but less than 80 percent of the time, and 7.5 percent were employed for less than 50 percent of the time.

We classified students on the basis of whether they were employed for at least 80 percent of the time during the study and post-study interval. Seventy-three percent of students who gained level 1–3 certificates, 80 percent of those who gained level 4 certificates, and 68 percent of those who gained diplomas were employed at least 80 percent of the time. Descriptive statistics indicate that students who were working for at least 80 percent of this period experienced 8–14 percent higher earnings growth on average than students who were employed for a smaller proportion of the time.

Not surprisingly, non-students in the matched comparison group samples were more likely to have worked continuously in this period when some of the students were taking a break from work. Approximately 85 percent of the comparison non-students worked for at least 80 percent of the months in the 'study and post-study interval' (a period defined by the studying patterns of the students they were matched to).

We used a regression model to examine the effect of employment continuity on earnings growth. First, we took the basic regression model described above and included an extra indicator variable in the vector of individual characteristics  $X$  to denote whether the individual met the 80 percent employment threshold.<sup>15</sup> The dependent variable for the regression is the same as previously. This modified regression specification enables us to evaluate the effect of gaining a qualification on earnings growth controlling for the average difference between the study and comparison groups in employment continuity.

The results, given in the first column of Table 3.11, indicate that this refinement to the basic model has a relatively small impact overall. A comparison of the results in Table 3.7 and the first column of Table 3.11 shows that the impacts of gaining a qualification for men are somewhat less negative and the impacts for women are somewhat more positive once we adjust for the average difference in employment continuity. For example, the estimate for males who completed a level 1–3 certificate changes from -4.2 percent to -3.2 percent.

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<sup>15</sup> We also estimated the regression using a continuous measure of employment continuity (that is, the proportion of time employed) but this made little difference to the results.

**Table 3.11:** Regression estimates of the impact of gaining a qualification on the change in log earnings, by level of highest qualification gained, gender and employment situation, study population and matched comparison group

|                              |                    | All           |       |              | Mainly working |       |              | Not mainly working |       |              |
|------------------------------|--------------------|---------------|-------|--------------|----------------|-------|--------------|--------------------|-------|--------------|
|                              |                    | Est           | SE    | No. students | Est            | SE    | No. students | Est                | SE    | No. students |
| <b>Level 1–3 certificate</b> |                    |               |       |              |                |       |              |                    |       |              |
| Total                        |                    | -0.010        | 0.007 | 6,020        | -0.006         | 0.008 | 4,390        | -0.024             | 0.015 | 1,640        |
| <i>Gender</i>                | Males              | <b>-0.032</b> | 0.008 | 2,360        | 0.015          | 0.009 | 1,760        | <b>-0.106</b>      | 0.019 | 600          |
|                              | Females            | 0.007         | 0.010 | 3,660        | 0.002          | 0.011 | 2,630        | 0.023              | 0.021 | 1,040        |
| <i>Gender and age</i>        | Males 25–34        | <b>-0.052</b> | 0.012 | 1,050        | <b>-0.045</b>  | 0.014 | 720          | <b>-0.076</b>      | 0.026 | 330          |
|                              | Males 35–44        | <b>-0.028</b> | 0.013 | 740          | -0.012         | 0.015 | 570          | <b>-0.226</b>      | 0.032 | 180          |
|                              | Males 45–64        | 0.014         | 0.015 | 570          | 0.014          | 0.016 | 470          | 0.019              | 0.045 | 100          |
|                              | Females 25–34      | -0.018        | 0.020 | 1,180        | -0.037         | 0.023 | 770          | 0.025              | 0.036 | 400          |
|                              | Females 35–44      | 0.002         | 0.016 | 1,380        | -0.008         | 0.018 | 980          | 0.039              | 0.033 | 400          |
|                              | Females 45–64      | <b>0.045</b>  | 0.016 | 1,110        | <b>0.051</b>   | 0.017 | 880          | 0.008              | 0.040 | 230          |
| <b>Level 4 certificate</b>   |                    |               |       |              |                |       |              |                    |       |              |
| Total                        |                    | 0.001         | 0.008 | 3,650        | 0.006          | 0.008 | 2,910        | 0.036              | 0.019 | 750          |
| <i>Gender</i>                | Males              | -0.011        | 0.009 | 1,400        | -0.008         | 0.010 | 1,160        | -0.030             | 0.025 | 240          |
|                              | Females            | 0.008         | 0.011 | 2,250        | 0.005          | 0.012 | 1,740        | <b>0.066</b>       | 0.025 | 500          |
| <i>Gender and age</i>        | Males 25–34        | <b>-0.048</b> | 0.017 | 500          | -0.035         | 0.019 | 360          | <b>-0.095</b>      | 0.037 | 140          |
|                              | Males 35–44        | -0.010        | 0.014 | 500          | -0.011         | 0.014 | 430          | -0.008             | 0.043 | 70           |
|                              | Males 45–64        | 0.026         | 0.018 | 400          | 0.017          | 0.018 | 370          | <b>0.121</b>       | 0.060 | 40           |
|                              | Females 25–34      | -0.002        | 0.022 | 700          | -0.026         | 0.026 | 480          | 0.060              | 0.042 | 220          |
|                              | Females 35–44      | -0.005        | 0.019 | 750          | -0.016         | 0.021 | 590          | 0.047              | 0.046 | 160          |
|                              | Females 45–64      | 0.030         | 0.016 | 790          | 0.018          | 0.017 | 670          | <b>0.123</b>       | 0.045 | 120          |
| <b>Diploma</b>               |                    |               |       |              |                |       |              |                    |       |              |
| Total                        |                    | <b>0.043</b>  | 0.012 | 1,790        | 0.007          | 0.014 | 1,220        | <b>0.158</b>       | 0.025 | 570          |
| <i>Gender</i>                | Males              | <b>-0.032</b> | 0.015 | 720          | -0.020         | 0.017 | 480          | <b>-0.075</b>      | 0.032 | 240          |
|                              | Females            | <b>0.088</b>  | 0.018 | 1,070        | 0.022          | 0.020 | 740          | <b>0.291</b>       | 0.036 | 330          |
| <i>Gender and age</i>        | Males aged 25–34   | <b>-0.043</b> | 0.019 | 410          | -0.033         | 0.022 | 240          | -0.071             | 0.038 | 170          |
|                              | Males aged 35–44   | 0.044         | 0.025 | 190          | 0.051          | 0.027 | 140          | 0.013              | 0.059 | 50           |
|                              | Males aged 45–64   | <b>-0.133</b> | 0.043 | 120          | -0.080         | 0.045 | 100          | s                  | s     | s            |
|                              | Females aged 25–34 | <b>0.086</b>  | 0.031 | 460          | -0.011         | 0.037 | 290          | <b>0.286</b>       | 0.053 | 180          |
|                              | Females aged 35–44 | <b>0.130</b>  | 0.032 | 330          | 0.055          | 0.035 | 240          | <b>0.429</b>       | 0.070 | 100          |
|                              | Females aged 45–64 | 0.049         | 0.027 | 270          | 0.030          | 0.030 | 220          | <b>0.159</b>       | 0.070 | 50           |

Notes: The regression includes a control for individuals employment situation during the 6 months before starting study to 24 months after completing study, and an interaction term between this and whether they gained a qualification or not. No. of students refers to the number of students in the study population. Estimates based on fewer than 40 students have been suppressed (s).

To identify whether the earnings benefits of gaining further qualifications varied between students who differed in their employment continuity, we included an interaction between the indicator variable that denotes whether the individual met the 80 percent employment threshold (which we take out of  $Z$  and denote by  $W$ ) and  $T$  (the indicator of whether the individual obtained an additional qualification):

$$\Delta Y_i = \alpha + \beta X_i + \xi W_i + \psi T_i + \delta T_i W_i + \varepsilon_i$$

The main parameter of interest is the coefficient associated with the interaction of  $W$  with  $T$  (that is,  $\delta$ , which identifies whether the effect of gaining a qualification differs between the two groups).

The results are given in the second and third columns of Table 3.11. These show that the negative impacts of further education for males who gained a level 1–3 certificate or diploma were mainly experienced by males who were employed for less than 80 percent of the study and post-study interval, and not by males who worked more continuously. For example, males who gained level 1–3 certificates who were employed for less than 80 percent of the time experienced an 11 percent reduction in their relative earnings (shown in the second column), while those who were working more continuously experienced a 1.5 percent increase (which was not significant, and is shown in the third column). With one exception, none of the study effects shown in the third column of the table for the ‘mainly employed’ group of males is statistically significant. The only negative result that remains significant is the estimate for males aged 25–34 who gained a level 1–3 certificate, which is -4.5 percent. In other words, men who were mainly working prior to studying and continued to do so during and after their study spell experienced essentially the same earnings growth on average as the matched non-students.

The results for females are markedly different from those of males and indicate that females whose employment was discontinuous gained *greater* benefits from further study. For example, females who obtained diplomas experienced a 9 percent earnings premium on average, but those who were employed for at least 80 percent of months experienced a 2 percent improvement in their relative earnings (which was an insignificant impact), while those who were employed less continuously experienced a 29 percent improvement. The differences in impacts for females at the certificate level follow this general pattern but are less extreme.

Summarising these results, men who were employed in the majority of months during the period from six months before enrolment until two years after completion of the qualification experienced very similar earnings growth to the comparison group on average, while men who were working less continuously had significantly lower earnings growth. The substantial reductions in the relative earnings of the minority of men whose employment was irregular resulted in an overall earnings penalty for all men (as reported in our main set of results). The pattern is different for women. Women who were *not* working at least 80 percent of the time immediately prior to studying, during and afterwards experienced *higher* earnings growth than the comparison group on average, while women

with more regular and continuous employment gained no significant improvement in their earnings.

A difference in the effects of further education on earnings could arise if taking a break from employment leads to a loss of work experience, training, or promotion opportunities, disadvantaging students who stop working for significant periods of time. The fact that employment interruptions are associated with poorer outcomes for men but better outcomes for women suggests other factors are also playing a role, however. For example, men with interrupted employment patterns may have had lower unmeasured skills than those who were working in the majority of months, while this was not true of women with interrupted employment patterns. Differences in the occupations and industries in which different groups of students were employed *after* their spell of education may have also influenced outcomes and contributed to the patterns observed. For example, there may have been an association between interrupted employment patterns and employment in low-wage industries such as food and hospitality or personal services.

#### *Whether changed employer after the study period*

Finally, we considered whether the earnings benefits of gaining further qualifications varied according to whether students remained with their pre-study employer. Within the group of students that we classified as employed for most of the pre-study, study, and post-study interval, we identified those who were still working for their pre-study employer two years after completion of the qualification and those who had changed employer. About 35 percent of those who gained level 1–3 certificates, 40 percent of those who gained level 4 certificates, and 33 percent of those who gained diplomas, were with the same employer 2 years afterwards. This compares with 45 percent, 46 percent, and 43 percent of the comparison group employees.<sup>16</sup>

When we examined the effect of changing employer on monthly earnings growth of all workers (students and comparison group members combined), we identified a small but significant positive effect. Workers who changed their employer had 3–5 percent higher earnings in the follow-up period. However, the results were quite different when we considered the effect of a change of employer on the earnings of students. Significant effects were obtained for just two subgroups of students, men at levels 1–3 and men at levels 5–6. These effects were negative, indicating that the students who changed employer had *lower* earnings growth than students who did not. Men who gained level 1–3 certificates and remained with their pre-study employer experienced a 0.8 percent improvement in earnings, which was not significantly different from zero, while those who changed employer experienced a significant earnings loss of 2.3 percent. Men who gained diplomas and remained with their pre-study employer experienced a 4.0 percent improvement in earnings, which was not

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<sup>16</sup> Among all students, including those who were not employed for at least 80 percent of months during the study spell and the 2 years afterwards, 27 percent of those who gained level 1–3 certificates, 33 percent of those who gained level 4 certificates, and 23 percent of those who gained diplomas were with the same employer 2 years afterwards. These proportions are lower than the comparable proportions of comparison group employees, of whom 39 percent, 42 percent, and 37 percent were still with the same employer.

significant, while those who changed employer experienced a significant earnings loss of 5.6 percent. It is difficult to know why changing employer was associated with poorer earnings outcomes for these groups of male students but not other gender-age groups or employees in general.

### **3.5.5 Robustness checks**

Our main results indicate that the completion of a certificate or diploma was generally not followed by an increase in students' relative earnings. There are a number of aspects of the research design could have affected these results, and we discuss those issues here.

#### *Quality of matching*

A critical issue for the validity of the results is whether the students in the study population were matched appropriately with comparable non-students, and would have shared the same earnings growth path if they had not undertaken further study.

If the students in the study population were on average less skilled than the employees in the comparison group, it is possible that they would have had lower earnings growth without the further education. In that case, our method would systematically underestimate the beneficial impact of gaining a qualification. The fact that there is no information in EOTE that can be used to compare educational attainment, and the students were not matched with non-students on the basis of their prior educational attainment or any measure of ability that is independent of their labour market situation, makes this issue potentially serious. In section 4 we explore it through a supplementary analysis of the research problem using data from SoFIE, in which we match the study population and comparison group on prior educational attainment as well as prior level of earnings.

*Not* matching students with non-students on the basis of their pre-study level of earnings could also lead to biased results if the pre-study earnings of the students were affected by part-time employment or by short-term earnings volatility to a greater extent than the earnings of non-students. Our earnings measure, average total monthly earnings, is greatly influenced by hours of work. Part-time employees have greater scope than full-time employees to increase their average monthly earnings simply by working longer hours. If we compare the workers in our study population with non-students who are matched by age, gender, and region but *not* earnings level, we find some significant differences in pre-study earnings, particularly for the level 1–3 certificate group. This comparison is shown in Table 3.12. The average monthly earnings of the workers who went on to study for a level 1–3 certificate, in the period 7–36 months before their enrolment, were significantly lower than those of their demographically matched counterparts (about \$2,800 compared with \$3,400). While there are several possible reasons for this difference, a higher rate of part-time employment is a leading candidate. In the log scale, the monthly earnings of students who gained level 1–3 certificates were on average about 17 percent lower than those of the matched comparison group (13 percent for males and 19 percent for females). For both males and females who gained level 4 certificates average log earnings were essentially the same as those in the



matched comparison group. For males and females who gained diplomas, average log earnings were 5 percent lower and 6 percent higher than those in the matched comparison group.

**Table 3.12:** Comparison of the initial earnings of the study population and demographically matched non-students

|                              | Average monthly earnings before study |            |       | Average log monthly earnings before study |            |            |
|------------------------------|---------------------------------------|------------|-------|---|------------|------------|
|                              | Study                                 | Comparison | Ratio | Study                                     | Comparison | Difference |
| <b>Level 1-3 certificate</b> |                                       |            |       |   |            |            |
| Total                        | 2,790                                 | 3,370      | 0.828 | 7.76                                      | 7.93       | -0.17      |
| Males                        | 3,500                                 | 4,130      | 0.847 | 8.07                                      | 8.20       | -0.13      |
| Females                      | 2,330                                 | 2,870      | 0.812 | 7.57                                      | 7.76       | -0.19      |
| <b>Level 4 certificate</b>   |                                       |            |       |   |            |            |
| Total                        | 3,310                                 | 3,400      | 0.974 | 7.95                                      | 7.94       | 0.01       |
| Males                        | 4,090                                 | 4,220      | 0.969 | 8.23                                      | 8.22       | 0.01       |
| Females                      | 2,820                                 | 2,890      | 0.976 | 7.78                                      | 7.76       | 0.02       |
| <b>Diploma</b>               |                                       |            |       |   |            |            |
| Total                        | 3,260                                 | 3,350      | 0.973 | 7.96                                      | 7.94       | 0.02       |
| Males                        | 3,770                                 | 4,040      | 0.933 | 8.14                                      | 8.19       | -0.05      |
| Females                      | 2,920                                 | 2,890      | 1.010 | 7.83                                      | 7.77       | 0.06       |

Notes: The comparison group is case-matched on age, gender, and region.

Earnings volatility can be the result of short- or medium-term shocks to an individual's earnings. A positive earnings shock would make a worker's current earnings higher than their longer-run average and would generally lead to slower earnings growth afterwards, as their earnings returned to the longer-run average. For example, a worker who had the opportunity to work in a well-paid second job for a limited time would temporarily have higher monthly earnings, but this higher level would not be sustained. A negative earnings shock would make a worker's current earnings lower than average, and would tend to be followed by faster than average earnings growth. Redundancy is an example of a situation that can cause a negative earnings shock. We think negative earnings shocks are more likely to prompt workers to return to education than positive earnings shocks, so there is a greater risk that students will tend to have *faster* than average post-study earnings growth than non-students, independently of the impact of the qualification on earnings growth.

Recall that we matched on employment and earnings in the period 7–36 months before the study spell. We did not include the 6 months immediately before the start of study because of the possibility of short-term negative shocks experienced by some of those who decide to study. However, it is possible that such shocks may precede this period and be experienced in the 7–36 months before study was begun (that is, during the period in which we measure pre-study earnings).

An analysis of patterns in the earnings data for *all* employees suggests that monthly earnings volatility is common, leading to a negative association between

employees' earnings level in one period and their earnings growth during the following 3–5 years. Individuals with relatively low monthly earnings initially tend on average to have faster earnings growth than those whose earnings were relatively high initially, and vice versa. Table 3.13 gives information on the earnings growth patterns of the comparison group individuals, stratified by their level of earnings during the pre-study reference period. Those in the bottom quartile of monthly earnings during the pre-study period experienced earnings growth of 78 percent (and a 0.54 change in the log of average earnings). This compares with 23 percent experienced by those in the second quartile of prior earnings (a 0.13 change in the log of average earnings), and 6 percent experienced by those in the highest quartile (a 0.01 change in the log of average earnings).

**Table 3.13:** Earnings growth rates of non-students grouped by their initial earnings level, demographically matched comparison group

|   | Earnings before study |            |            |            |
|---|-----------------------|------------|------------|------------|
|   | Quartile 1            | Quartile 2 | Quartile 3 | Quartile 4 |
| Average monthly earnings during the pre-study reference period  | 1,240                 | 2,590      | 3,650      | 5,740      |
| Average monthly earnings during the post-study reference period | 2,210                 | 3,180      | 4,080      | 6,090      |
| Percentage change in earnings                                   | 78.2                  | 22.8       | 11.8       | 6.1        |
| Log monthly earnings during the pre-study reference period      | 6.998                 | 7.853      | 8.198      | 8.628      |
| Log monthly earnings during the post-study reference period     | 7.539                 | 7.981      | 8.250      | 8.640      |
| Change in log monthly earnings                                  | 0.541                 | 0.128      | 0.052      | 0.012      |

Notes: The comparison group is case-matched to the main study population on age, gender, and region and weighted to reflect the demographic profile of the main study population.

Our regression models compare the earnings growth of the study population and comparison group between two common time points, so any differences in individuals' level of earnings before study will not affect the results directly. By matching on prior earnings level, however, we hope to achieve two things. First, we hope to increase the likelihood that a student who was part-time employed in the pre-study period (and so has greater opportunity to increase their earnings by increasing their hours) is matched to a non-student who was part-time employed in the pre-study period. Second, we hope to increase the likelihood that a student whose earnings were temporarily low/high in the pre-study period is matched with a non-student whose earnings were temporarily low/high, so that their subsequent earnings growth paths (whether unusually rapid or unusually slow) are more similar.

It is likely that in practice there is still considerable mis-matching on these two factors, prompting us to investigate the impact of different case-matching methods on our estimates. We show the results obtained from different case matching and regression methods, with and without the use of information on individuals' prior earnings, in Table 3.14. All results in Table 3.14 are based on a common sample of students, the main study population.

**Table 3.14:** Comparison of different matching case-matching criteria and regression specifications, estimates of the impact on gaining a qualification on the change in log monthly earnings, by level of highest qualification gained and gender

| Case matching                | Case-matching on age, gender, and region |       |                |       |                           |       |   |       | Case-matching on age, gender, region, prior employment, self-employment, benefit receipt, & earnings |       |               |       | Case-matching on age, gender, region, prior employment, earnings, & industry |       |
|------------------------------|--|-------|----------------|-------|---------------------------|-------|---|-------|--|-------|---------------|-------|--|-------|
|                              | None                                     |       | Prior earnings |       | Prior earnings & industry |       | Prior earnings, industry, benefit & self-employment |       | None   |       | Industry      |       | None   |       |
| Regression controls          | (1)                                      |       | (2)            |       | (3)                       |       | (4)   |       | (5)  |       | (6)           |       | (7)  |       |
|                              | Est                                      | SE    | Est            | SE    | Est                       | SE    | Est   | SE    | Est  | SE    | Est           | SE    | Est  | SE    |
| <b>Level 1–3 certificate</b> |  |       |                |       |                           |       |   |       |  |       |               |       |  |       |
| Total                        | <b>0.023</b>                             | 0.005 | <b>-0.040</b>  | 0.004 | <b>-0.034</b>             | 0.004 | <b>-0.037</b>                                       | 0.004 | <b>-0.015</b>  | 0.006 | <b>-0.020</b> | 0.007 | <b>-0.022</b>  | 0.005 |
| Male                         | <b>-0.027</b>                            | 0.006 | <b>-0.071</b>  | 0.006 | <b>-0.067</b>             | 0.006 | <b>-0.063</b>                                       | 0.006 | <b>-0.038</b>  | 0.008 | <b>-0.042</b> | 0.008 | <b>-0.039</b>  | 0.006 |
| Female                       | <b>0.056</b>                             | 0.007 | <b>-0.027</b>  | 0.006 | <b>-0.021</b>             | 0.006 | <b>-0.026</b>                                       | 0.006 | -0.001   | 0.009 | -0.005        | 0.009 | -0.012   | 0.007 |
| <b>Level 4 certificate</b>   |  |       |                |       |                           |       |   |       |  |       |               |       |  |       |
| Total                        | <b>-0.020</b>                            | 0.006 | <b>-0.015</b>  | 0.005 | <b>-0.024</b>             | 0.006 | <b>-0.023</b>                                       | 0.006 | -0.004   | 0.008 | -0.009        | 0.008 | -0.012   | 0.006 |
| Male                         | <b>-0.027</b>                            | 0.006 | <b>-0.025</b>  | 0.007 | <b>-0.034</b>             | 0.007 | <b>-0.032</b>                                       | 0.007 | -0.018   | 0.010 | -0.019        | 0.009 | <b>-0.027</b>  | 0.008 |
| Female                       | -0.016                                   | 0.009 | -0.008         | 0.008 | <b>-0.021</b>             | 0.008 | <b>-0.020</b>                                       | 0.008 | 0.004  | 0.012 | -0.003        | 0.012 | -0.003   | 0.009 |
| <b>Diploma</b>               |  |       |                |       |                           |       |   |       |  |       |               |       |  |       |
| Total                        | 0.009                                    | 0.009 | 0.016          | 0.008 | -0.003                    | 0.008 | 0.002   | 0.008 | <b>0.038</b>   | 0.012 | 0.019         | 0.012 | 0.014  | 0.009 |
| Male                         | <b>-0.039</b>                            | 0.011 | <b>-0.055</b>  | 0.010 | <b>-0.069</b>             | 0.011 | <b>-0.068</b>                                       | 0.011 | <b>-0.041</b>  | 0.014 | <b>-0.059</b> | 0.015 | <b>-0.066</b>  | 0.011 |
| Female                       | <b>0.041</b>                             | 0.013 | <b>0.067</b>   | 0.011 | <b>0.045</b>              | 0.012 | <b>0.042</b>  | 0.012 | <b>0.091</b>   | 0.017 | <b>0.068</b>  | 0.018 | <b>0.068</b>   | 0.013 |

Notes: All results are based on the same sample of students

(1) Case-matching on age, gender, and region.

(2) Case-matching on age, gender, and region with regression controls for prior earnings.

(3) Case-matching on age, gender, and region with regression controls for prior earnings and industry.

(4) Case-matching on age, gender, and region with regression controls for prior earnings, industry, employment, benefit receipt and self-employment.

(5) Case-matching on age, gender, region, prior employment and earnings, benefit receipt, and self-employment.

(6) Case-matching on age, gender, region, prior employment and earnings, benefit receipt, and self-employment. Regression controls for industry of employment before study.

(7) Case-matching on age, gender, region, prior employment, earnings, and industry.

Column 1 in Table 3.14 shows the estimates obtained if we select and match the comparison group individuals only on the basis of age, gender, and region. In column 2, we include a measure of prior earnings in the regression model as a control variable, to eliminate the effects of any differences in the average level of prior earnings between the study population and comparison group. In column 3 we add regression controls for industry of employment prior to study, and in column 4, further controls for the number of months employed, self-employed, and in receipt of benefit income, before studying.

Column 5 shows the results given by our full case-matching approach, which selects comparison group individuals with closely matching labour market outcomes in the pre-study period as well as the same age, gender, and region of residence. The most important of these labour market variables (the one with greatest impact on results) is the pre-study average earnings level. Column 6 shows the results of the case-matching approach combined with a regression control for industry of employment before study. This is the approach used to obtain the main results reported above.

Finally, column 7 shows the results of an extended case-matching approach that included industry of employment before study in the case-matching variables.

Many of the results given in Table 3.14 are not materially altered by the variations in matching approach. For example, they have little impact on the results for level 4 certificates, which show a small negative impact for both men and women across all variations. The main effects of controlling for prior earnings level, whether through a regression control or through case-matching, are to reduce the estimate for women who gained level 1–3 certificates from a positive impact (5.6 percent) to an insignificant impact (-0.5 percent), and to increase the positive impact for women who gained a diploma from 4.1 percent to 6.8 percent. There are smaller effects on the estimates for men who completed a level 1–3 certificate or a diploma, which are slightly more negative in our final model.

These results can be intuitively understood by referring back to the data on the pre-study earnings of the students and non-students in Table 3.12. The level 1–3 students had lower earnings than the comparison group workers before the study spell. Comparing them with non-students with similarly low earnings in the pre-study period leads to lower estimates of the benefits of gaining a qualification, because working adults with low monthly earnings had relatively rapid earnings growth regardless of whether or not they undertook further education. Female diploma students had higher pre-study earnings than other demographically matched employees, and comparing them with non-students who had similarly high earnings (and lower subsequent earnings growth on average) increases our estimate of the positive impact of gaining a qualification on earnings growth.

To summarise, our decision to match the study population and comparison group on prior earnings level has led to a somewhat less favourable estimate of the benefits for further study for women gaining level 1–3 certificates than would otherwise be the case. Matching on prior earnings level has led to a somewhat more favourable estimate of the benefits for further study for women gaining

diplomas than would otherwise be the case. The results for other age-gender and level of qualification combinations were not greatly altered by differences in case-matching approach.

We have explained why controlling for prior level of earnings was an appropriate adjustment to make and believe that not doing so would lead to some of the impacts being mis-estimated. However, controlling for prior earnings level is a relatively crude way of adjusting for several unmeasured factors that have the potential to influence employees' monthly earnings growth paths (such as changes in their hours of work), and it is possible that significant differences between the study and comparison groups remain, distorting our main results. Despite our strategy of case-matching on prior earnings level, there continues to be a strong association in our final results between students' prior earnings and their likelihood of benefiting from further education (as was reported in section 3.5.4). This suggests that we may not have done enough to eliminate the effects of differences in pre-study rates of part-time employment or other potentially biasing factors. We return to this issue in our analysis of the data from SoFIE.

#### *Change in average monthly earnings the main outcome measure*

In the main results presented above we were able to consider the impact of further education only on total monthly earnings, as EOTE does not provide any measures of hours worked or wage rates. Changes in total monthly earnings can result from changes in wage rates or from changes in hours worked. A study that compared wage growth rather than monthly earnings growth would have the advantage of excluding this important source of variation in the outcomes of the study and comparison groups.

In addition, it would be more useful to know the impact of further education on a worker's wages than on their monthly earnings, because the wage rate is more likely to reflect the value of their skills to employers. An increase in wages suggests that an increase in the value of the worker's skills has occurred, while an increase in hours of work may be due to the worker's own labour supply decisions. In the next section, we compare the impact of further education on different measures of earnings growth using data from SoFIE.

#### *Studying in the three years before the reference study spell*

It is possible that our decision to include students who had studied during the 2–3 years before the start of the reference study spell in the study population means that students' average earnings before the reference spell are underestimated. If so, our estimates of the impact of gaining a qualification on post-study earnings growth will be overstated. We explored this possibility by re-estimating the main results after excluding those who had studied in the previous three years from the sample. Overall, the results were little changed, indicating that this aspect of the study design probably did not affect the main results.

### 3.5.6 Extensions

We present a limited set of results on the earnings impacts of higher qualifications and the impacts of further education on employment rates in this section.

#### *Earnings impacts associated with higher qualifications*

Applying our research design to employees who gained qualifications at bachelor degree and higher levels during the same time period, we find evidence of much larger earnings benefits. The results are presented in Table 3.15. They indicate that women who completed a bachelor's degree increased their average monthly earnings by around 20 percent. Similarly, large increases were associated with graduate certificates, honours degrees and postgraduate diplomas, and master's degrees. Men also experienced significant earning benefits if they completed one of these higher qualifications, with the exception of bachelor's degrees.

Although these results suggest that gaining a higher-level qualification leads to significant earnings benefits, we are cautious about the validity of these particular estimates, for several reasons.

First, relatively small proportions of the adults who enrolled in higher qualifications during 2003–2005 completed them within our reference period. When we examined completion patterns, we found that of those who started a degree in 2003 and had completed it by the end of 2008, only 45 percent had completed by the end of 2005. By comparison, 83 percent and 64 percent of those who started a certificate or diploma in 2003 and completed it by the end of 2008, had completed by the end of 2005. Students who completed quickly are unlikely to be representative of all working adults who gained these higher qualifications.

Second, our sample of working adults who completed the higher qualifications during the 2003–2005 reference period is concentrated in a limited number of subject fields, and we are unsure if their outcomes are typical of other subject fields. For example, approximately 60 percent of the bachelor's degrees and graduate certificates or diplomas were in education, and 50 percent of the honours degrees were in health.

Third, many working adults who enrol at postgraduate level have a high level of education already. They may also have specific occupational skills that drive their earnings growth profiles. We cannot match them with similarly qualified and skilled adults because of the limited range of variables within EOTE. Therefore, there is a risk that the large positive impacts in Table 3.15 are generated by poor matching.

Finally, it is possible to compare our main set of results for undergraduate certificates and diplomas with an alternative set of results obtained using data from SoFIE, but it is not possible to do this for higher qualifications because there are not enough cases of working adults who gained those higher qualifications in the SoFIE sample.

**Table 3.15:** Estimated improvement in average earnings in the third year post-study, by highest qualification gained by gender, study population (n=15,120), and matched comparison group

| Level                             | Total         |       |       | Males         |       |       | Females      |       |       |
|-----------------------------------|---------------|-------|-------|---------------|-------|-------|--------------|-------|-------|
|                                   | Est           | SE    | N     | Est           | SE    | N     | Est          | SE    | N     |
| Level 1–3 certificate             | <b>-0.020</b> | 0.007 | 6,020 | <b>-0.042</b> | 0.008 | 2,360 | -0.005       | 0.009 | 3,650 |
| Level 4 certificate               | -0.009        | 0.008 | 3,650 | -0.018        | 0.009 | 1,400 | -0.003       | 0.012 | 2,250 |
| Diploma                           | 0.019         | 0.012 | 1,790 | <b>-0.059</b> | 0.015 | 720   | <b>0.068</b> | 0.018 | 1,070 |
| Bachelor’s degree                 | <b>0.202</b>  | 0.017 | 1,010 | <b>0.074</b>  | 0.030 | 230   | <b>0.247</b> | 0.020 | 780   |
| Graduate certificate/<br>diploma  | <b>0.166</b>  | 0.018 | 990   | <b>0.080</b>  | 0.026 | 310   | <b>0.207</b> | 0.024 | 680   |
| Honours/post-<br>graduate diploma | <b>0.145</b>  | 0.012 | 1260  | <b>0.099</b>  | 0.017 | 400   | <b>0.158</b> | 0.016 | 860   |
| Master’s degree                   | <b>0.200</b>  | 0.026 | 370   | <b>0.176</b>  | 0.034 | 170   | <b>0.199</b> | 0.038 | 200   |

Note: Estimates in bold are statistically significant at the 5 percent level.

### *Employment impacts of certificates and diplomas*

This paper has focused on changes in earnings growth rather than changes in employment rates for two main reasons: our concerns about the quality of EOTE-based employment rate estimates and the possibility that post-study employment rate changes are often driven by student choices rather than improvements in ‘employability’ due to further education.

Employment rates are not well measured in EOTE because of a lack of information on external migration. If people who complete a qualification are more or less likely to remain a New Zealand resident afterwards than people who do not, our estimates will be biased. Drawing a causal link between further education and subsequent changes in employment rates is also questionable in the absence of a controlled experiment. If people who are not working on a regular basis decide to obtain a new qualification in preparation for an intended return to regular employment, their average employment rate is likely to be higher afterwards regardless of the impact of the education on their skills or employability.

These are important concerns, but to make the results in this paper more complete, we briefly explore the employment effects that may have been experienced by working adults who obtained a certificate or diploma. By design, the adults in our main study population were employed for at least 6 months in the period 7–36 months before the start of their reference study spell and at least 6 months in the period 25–36 months after study. To explore the impact of further education on employment rates, we drop the requirement that students had to have some waged employment in the third year after completion and consider a slightly broader population of working adults who met the other selection criteria. The study population is enlarged from 15,120 individuals to 21,230 individuals when we relax the requirement for post-study employment.

Figure 3.5 shows employment rates before, during, and after the study spell for this broader population of certificate and diploma students and their matched comparison groups. These descriptive results suggest that those who completed

certificates experienced small positive employment effects post-study, but these reduced over time, with little or no impact evident 3–4 years after completion. Those who obtained diplomas experienced larger employment effects that were maintained in the four years after the qualification was completed. Employment rates are consistently lower after the study spell than before it for both the students and non-students, but this is largely a consequence of the study design (involving selection on the basis of pre-study employment).

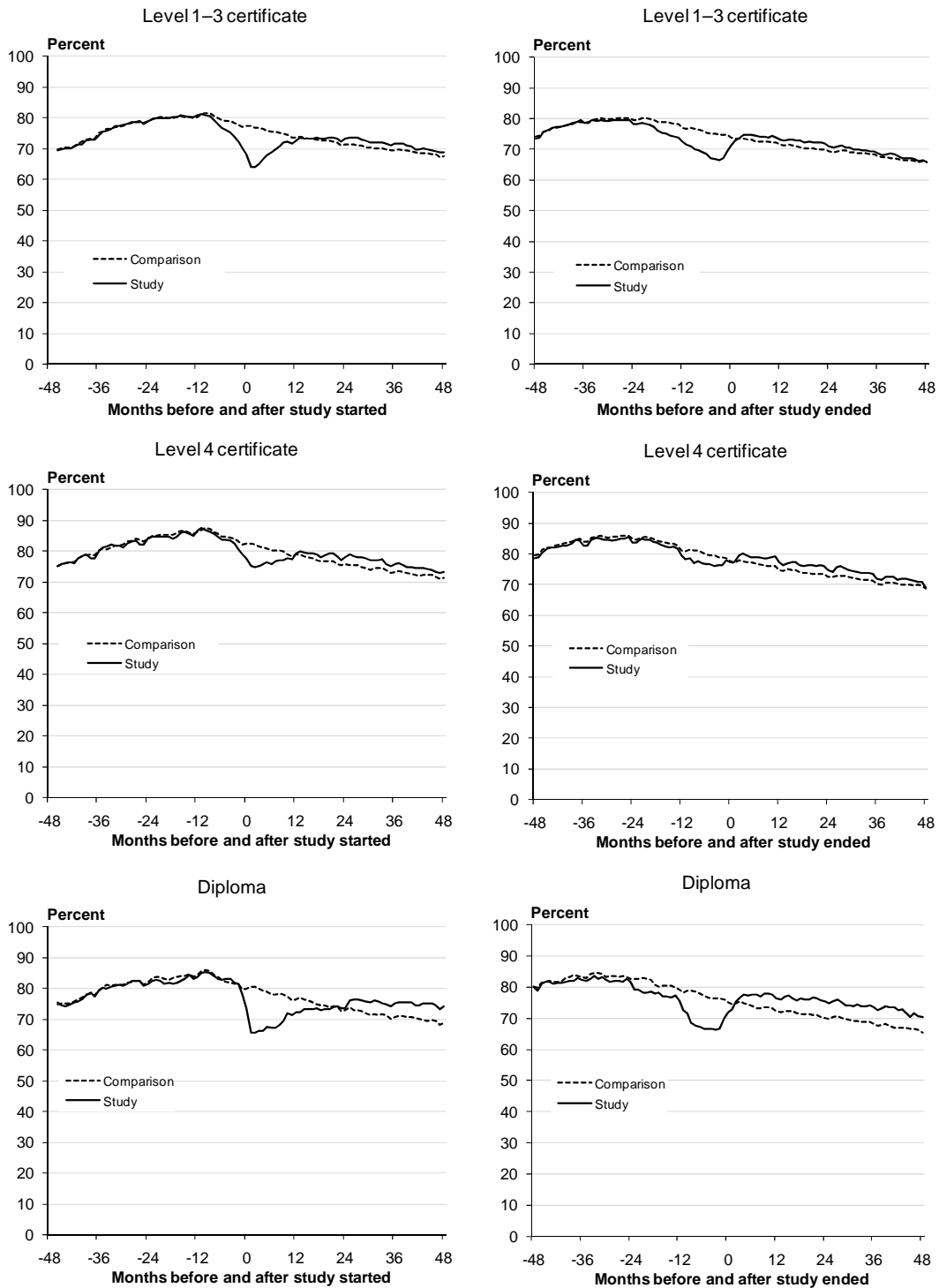
Employment impact estimates calculated for this broader study population are presented in Table 3.16. The dependent variable used in the underlying regressions is based on the change in the proportion of months employed before and after study. Specifically, it is the difference between the proportion of months the individual was employed 7–36 months before study and the proportion of months they were employed in the period 25–36 months after the qualification was completed.

Overall, those who gained a qualification at any level were more likely to be employed during the third year after studying than the comparison group members. Those who gained level 1–3 certificates were 2 percent more likely to be employed, those who gained level 4 certificates were 3 percent more likely to be employed, and those who gained diplomas were 6 percent more likely to be employed. The impacts were greater for those who gained bachelor's degrees (9 percent) or graduate certificates or diplomas (15 percent). Those who gained honours' degrees or postgraduate diplomas and master's degrees were 4 percent and 3 percent more likely to be employed than those in their respective comparison group. Women experienced much larger employment effects than men across all qualification levels, with the exception of honours degree or postgraduate diplomas or certificates.

These results indicate that completing a qualification was followed by a higher likelihood of employment, with small impacts at the lowest and highest qualification levels and larger impacts for diplomas and degrees. However, we would caution readers from assuming that these results provide a reliable indication of the employment 'return' to gaining a further qualification as we believe that post-study employment could be driven by student choices rather than (or perhaps in combination with) improvements in employability due to further education.



**Figure 3.5:** Employment rates in the months before and after study, wider study population, by highest qualification gained



**Table 3.16:** Estimated improvement in employment in the third year post-study, by highest qualification gained by gender, wider study population (n=21,230), and matched comparison group

| Level                             | Total        |       |       | Males        |       |      | Females      |       |       |
|-----------------------------------|--------------|-------|-------|--------------|-------|------|--------------|-------|-------|
|                                   | Est          | SE    | N     | Est          | SE    | N    | Est          | SE    | N     |
| Level 1–3 certificate             | <b>0.017</b> | 0.004 | 8,880 | <b>0.012</b> | 0.006 | 3420 | <b>0.021</b> | 0.005 | 5,450 |
| Level 4 certificate               | <b>0.028</b> | 0.005 | 5,010 | <b>0.019</b> | 0.008 | 1910 | <b>0.034</b> | 0.007 | 3,100 |
| Diploma                           | <b>0.056</b> | 0.007 | 2,490 | <b>0.039</b> | 0.011 | 1000 | <b>0.067</b> | 0.010 | 1,480 |
| Bachelor's degree                 | <b>0.086</b> | 0.010 | 1,320 | <b>0.048</b> | 0.021 | 350  | <b>0.102</b> | 0.012 | 980   |
| Graduate certificate/<br>diploma  | <b>0.150</b> | 0.010 | 1,300 | <b>0.098</b> | 0.019 | 420  | <b>0.176</b> | 0.012 | 880   |
| Honours/post-<br>graduate diploma | <b>0.040</b> | 0.009 | 1,660 | <b>0.044</b> | 0.016 | 530  | <b>0.030</b> | 0.011 | 1,130 |
| Master's degree                   | <b>0.031</b> | 0.015 | 550   | 0.014        | 0.025 | 250  | <b>0.062</b> | 0.023 | 290   |

Notes: Estimates in bold are statistically significant at the 5 percent level. The wider study population included those that were not employed for 6 months or more in the third year after study.

### 3.6 Summary of findings

Approximately 60 percent of students in our study population of 25–64-year-olds who completed a certificate or diploma in 2003–2005 were female. About 40 percent were aged 25–34, one-third aged 35–44, and the remaining one-quarter aged 45–64.

The average duration of study was 12 months for level 1–3 certificates, 14 months for level 4 certificates, and 17 months for diplomas. About two-thirds mainly studied on a full-time basis and the other one-third mainly studied on a part-time basis. The average number of EFTS that students enrolled in during the study period ranged from 0.8 for the students who undertook level 1–3 certificates to 1.2 for the students who completed diplomas. The number of EFTS enrolled in was on average lower than the EFTS associated with the qualification, suggesting that some students were finishing qualifications they had begun earlier.

Most of the students were working in waged or salaried jobs on a continuous or close to continuous basis before studying. On average, the students had worked for 10–11 months of the year immediately before enrolment and for 30–31 months of the three years before prior to enrolment. Average monthly earnings in the pre-study year ranged from \$2,950 for the students who obtained level 1–3 certificates (implying annual earnings of \$35,400 in March 2007 dollar values) to \$3,450 for the students who obtained diplomas (implying annual earnings of \$41,400).

Our main estimates of the impact of gaining a qualification on monthly earnings indicate that only women who obtained a diploma had gained significant earnings premiums by the third year after completion. The monthly earnings of 25–34-year-old and 35–44-year-old women who completed a diploma were 8 percent and 13 percent higher than those of the matched comparison group. We found either small negative impacts or no significant impact on the earnings of male diploma students and men and women who completed certificates at levels 1–4.

When analysed by detailed field of study, we found that students who completed a level 1–3 certificate in business and management improved their relative earnings by 6 percent, and women who completed a level 1–3 certificate in human welfare studies and services improved their relative earnings by 7 percent. Women who completed level 4 certificates in office studies, nursing, public health, and language and literature (nearly all in Te Reo Māori) improved their earnings by 22 percent, 18 percent, 14 percent, and 5 percent respectively. Men and women who completed diplomas in business and management and women who qualified at diploma level in teacher education improved their relative earnings by 11–12 percent. Earnings premiums that were not statistically significant were found in other fields where student numbers were low. The impact estimates by field of study also include an appreciable number of negative impacts, suggesting that studying for a certificate or diploma was disadvantageous for some groups of students, reducing their earnings growth relative to the growth they would have experienced if they had not studied.

Further analysis of the results indicated that the estimated benefits of gaining a qualification did not vary in a systematic manner across students who studied for different durations or at different levels of intensity, within their qualification level subgroup. It was not the case that students who studied for longer or took more courses consistently had higher post-study earnings growth. However, we found a strong inverse relationship between students' pre-study level of earnings and the impact of gaining a qualification on post-study earnings, for women at all levels considered and for men who completed diplomas. For these groups, students with low average monthly earnings before they began studying experienced the largest earnings benefits from gaining a qualification, while those with relatively high monthly earnings before they began studying experienced an earnings penalty on average. One likely explanation is that the students were more likely than the people in the comparison group to change their hours of work in the post-study period, with some students in the lowest earnings quartile who were previously part-time employed increasing their hours and some students in the high-earnings quartile, who were previously full-time employed, reducing their hours. This explanation is consistent with the fact that the association between prior earnings level and subsequent earnings growth is much stronger for women than for men.

Further analysis also provided useful information on the variation in impacts among students with different levels of employment continuity before, during, and after their study spell. Men who were working for most of the time before studying, during the study spell, and afterwards, experienced very similar earnings growth to the matched comparison group on average, while men who worked for less than 80 percent of months in this interval experienced significant earnings losses. The fact that we estimated earnings penalties for men who completed level 1–3 certificate or diplomas in our main set of results was entirely due to the poorer outcomes of these discontinuously employed men. (The losses experienced by the minority of men with significant employment interruptions resulted in an overall earning loss for all males on average.)

The pattern is different for women. Women who were *not* working in at least 80 percent of months immediately before studying, during, and afterwards experienced *higher* earnings growth than the comparison group women on

average, while those who were working on a continuous or close to continuous basis experienced no significant improvement in their earnings. Although we cannot tell what was driving these patterns, it is possible that women who took a break from employment also increased their hours of work after returning to work.

We explored the sensitivity of our main estimates to variations in the set of variables used to select (case-match) the comparison group, and to control for any remaining differences between the comparison group and study population in the regression analysis. In particular, we assessed the impact of matching on prior earnings level and the impact of adjusting for prior industry of employment. Whether or not we use these variables in our analysis affects some of our results, but dropping them would not lead to substantially different findings.

We presented a limited set of results on the impacts of studying for higher qualifications on earnings and the impacts of further education on employment rates. Applying our research design to employees who gained qualifications at bachelor degree and higher levels during the same period, we find evidence of much larger benefits. Women who completed a bachelor's degree increased their average monthly earnings by around 20 percent. Similarly, large increases were associated with graduate certificates, honours degrees and postgraduate diplomas, and master's degrees. Men also experienced significant earning benefits if they completed one of these higher qualifications, with the exception of bachelor's degrees. We do not have full confidence in these estimates, for the reasons that are discussed above.

We find small positive employment rate effects in an analysis of the employment outcomes that followed further study. Those who gained level 1–3 certificates were 2 percent more likely to be employed, those who gained level 4 certificates were 3 percent more likely to be employed, and those who gained diplomas were 6 percent more likely to be employed than the comparison non-students, in the third year after completion. We discuss the issues associated with these employment impact estimates in section 3.5.6.

## **4 SUPPLEMENTARY ANALYSIS OF THE RETURNS TO EDUCATION USING SOFIE**

### **4.1 Introduction**

We analyse the impact of gaining a qualification on earnings growth using data from the Survey of Families, Income and Employment (SoFIE) in this section of the paper. The purpose of the analysis is, first, to explore the characteristics of workers who obtain new certificate and diploma qualifications at ages 25 and over, using information on that is not available in the Employment Outcomes of Tertiary Education (EOTE) data set; second, to compare estimates obtained using different earnings measures (hourly compared with weekly compared with monthly); and third, to compare estimates obtained with and without controls for prior educational attainment.

The main advantage of SoFIE lies in its extensive range of variables. A disadvantage of SoFIE is that the number of people in the SoFIE sample who gained a new certificate or diploma qualification while aged 25–64 is relatively small, which means estimates of the effects of this further education are likely to be imprecise. Impacts that could be judged economically significant (such as a 10 percent increase in earnings) may not be statistically significant simply because of the small student samples. We do not expect to be able to draw firm conclusions on the size of the impacts because of the small samples.

Another limitation of SoFIE as a data source for this research question is that we cannot distinguish qualifications that were obtained through industry training from qualifications that were obtained from tertiary education providers. Both are included in the analysis that follows.

The data are described in section 4.2 and the methods in section 4.3. The characteristics of the students are summarised in section 4.4. The analysis and results are presented in section 4.5. Section 4.6 summarises the main findings.

### **4.2 Data source**

SoFIE is a longitudinal household survey conducted by Statistics New Zealand. A representative sample of approximately 22,000 adults was selected in 2002–2003 and interviewed at 12-month intervals over an eight-year period. At the time this paper was written, seven years (or waves) of data were available for research use, covering the period from 2001–2003 to 2007–2009.

Only qualifications that normally take at least 3 months of full-time study to obtain are recorded in SoFIE. Shorter qualifications are not recorded. It is not possible to tell which level 1–4 qualifications were obtained through industry training programmes and which were obtained at tertiary institutions, as this information is not collected. The administrative data show that in 2005, 35 percent of level 1–3 qualifications, 35 percent of level 4 qualifications, and 8 percent of level 5–6 qualifications gained by those aged 25–64 (excluding those requiring less than three months of study to complete) were gained through industry training rather than tertiary education providers. The

proportion of level 1–4 qualifications gained through industry training increased from 26 percent in 2003 to 46 percent in 2008.

### 4.3 Methods

Using SoFIE’s sample of longitudinal respondents, we selected a study population comprising working adults aged 25–64 who completed a post-school qualification at certificate or diploma level during waves 3–6 of the survey, and a non-student comparison sample comprising working adults aged 25–64 who did not undertake any tertiary study or gain new qualifications. We compared the earnings growth of the students and non-students from wave 1 to wave 7 within a regression framework.

More specifically, the study population comprises people who:

- were aged 25–64 at wave 3
- were employed in a waged or salaried job(s) in both the wave 1 and wave 7 reference years for at least four weeks;
- gained a new post-school qualification at levels 1–6 on the New Zealand Qualifications Framework during the wave 3–6 reference years, and gave the date of obtaining this qualification as 2003 or later
- did not undertake much study during the wave 1 or wave 7 reference years (but up to three months was permitted).

About 320 people met these criteria. The qualifications that are the focus of this analysis were obtained in the period from 1 October 2003 to 30 September 2008. This is a longer reference period than was used in the EOTE-based analysis, which focused on qualifications obtained in the 2003 to 2005 period.

We divided the student sample into two subgroups for the analysis: those who obtained a certificate at levels 1–3 and those who obtained a level 4–6 certificate or diploma. We combined level 4 qualifications (mostly certificates) with level 5–6 qualifications (mostly diplomas) because the number of people achieving each was small and the coding of qualification level in SoFIE is less reliable than in an administrative data source such as EOTE. If more than one qualification was obtained during the period from wave 3 to wave 6, we focused on the higher qualification.

The comparison group comprised people who:

- were aged 25–64 at wave 3
- were employed in a waged or salaried job(s) in both wave 1 and wave 7 for at least four weeks;
- did not study towards a qualification or obtain any new post-school qualifications during the SoFIE reference period (waves 1–7).

The comparison sample comprised approximately 4,250 individuals. Because of the limited size of the SoFIE sample, we decided against using a case-matching approach to select matched comparison group individuals. Instead, we matched the study population and comparison groups on demographic characteristics at a group level by modifying the sample weights so as to make the gender and age group distribution of the comparison group exactly match that of each student

subgroup (level 1–3 qualifications and level 4–6 qualifications). Other differences between the students and comparison groups are taken into account at the analysis stage through regression model controls.

Three measures of earnings growth were constructed as outcome measures: the change in the log of average monthly earnings, the change in the log of average weekly earnings, and the change in the log of average hourly earnings, between wave 1 and wave 7. All earnings figures were converted to March 2007 dollar values before the log values were taken. If a person held two or more jobs during the wave 1 or wave 7 reference years, we calculated an appropriately weighted average of their hourly and weekly earnings in the different jobs they held.

Average monthly earnings were calculated by estimating total earnings from waged or salaried jobs in each calendar month and then taking the average of all non-zero months during the reference year. This is similar to the measure of average monthly earnings that the EOTE data set provides.

Our analytical strategy is to regress each measure of earnings growth on a set of control variables, including a dummy variable to indicate whether the individual obtained a post-school qualification. The regression model is:

$$\Delta Y = \alpha + \delta T + \beta X + \varepsilon$$

where the dependent variable  $Y$  is the change from wave 1 to wave 7 in real average hourly earnings, weekly earnings, or monthly earnings in different models,  $T$  is an indicator of whether the individual obtained an additional qualification, and  $X$  is a vector of other variables describing individual characteristics before the study spell.

The effects of obtaining a level 1–3 qualification are modelled separately from the effects of obtaining a level 4–6 qualification.

## **4.4 Sample characteristics**

The demographic characteristics, education, hours, and earnings of the study population and comparison group are summarised in Tables 4.1 and 4.2. Note that the comparison group results were obtained after weighting the age and gender distribution of the non-students to match that of each student subgroup.

### **4.4.1 Students who obtained a level 1–3 certificate**

The adults who obtained a level 1–3 qualification were aged 42 on average and 60 percent were female. Nineteen percent had no qualification previously and 14 percent had a lower school qualification only (that is, National Certificate of Educational Achievement level 1 or equivalent). Fourteen percent had a level 1–3 post-school qualification before the reference study spell, and 42 percent had a higher qualification.

Combining the no qualification and school qualification groups, we estimate that 44 percent of this group raised their level of educational attainment as a result of their further study. The other 56 percent were qualified at an equivalent or higher level already.

The pre-study educational attainment profile of the student group was similar to that of the comparison group. However, the average earnings of the students were lower than those of the matched comparison group workers before their return to education. This is true for both men and women.

The final section of Table 4.1 compares the unadjusted earnings growth of the study and comparison group members from wave 1 to wave 7, using the change in the log of each earnings variable to measure earnings growth (as in the following regression analysis). The students who obtained a level 1–3 certificate experienced lower wage growth over the period, but faster growth in weekly and monthly earnings, than the matched comparison group.

#### **4.4.2 Students who obtained a level 4–6 certificate or diploma**

Those who obtained a level 4–6 qualification were aged 39 years on average and 50 percent were female (Table 4.2). Nearly 80 percent held a post-school qualification before they completed the reference qualification. Compared with the demographically matched comparison group, the students in this subgroup were significantly more qualified. They were much more likely to have a degree or a degree-level qualification, for example.

About 38 percent of the students increased their qualification level as a result of the new qualification. Twenty-five percent already held a qualification at the same level, and 36 percent already held a qualification at a higher level.

Despite their relatively high pre-study qualifications, the hourly, weekly, and monthly average earnings of the students were slightly lower than those of the comparison group at the start of the study period. However, they experienced faster wage and earnings growth and by wave 7 had higher average earnings than the comparison group individuals across all three measures.



**Table 4.1:** Characteristics of the Survey of Families, Incomes and Employment sample and comparison group, by highest level of qualification gained

|   | Level 1–3 |            | Level 4–6 |            |
|---|-----------|------------|-----------|------------|
|   | Students  | Comparison | Students  | Comparison |
| Sample size   | 180       | 4,255      | 150       | 4,255      |
| <b>Demographic characteristics</b>                  |           |            |           |            |
| Female (%)  | 60.1      | 60.1       | 50.4      | 50.4       |
| Mean age (at wave 3)                                | 41.8      | 41.8       | 38.9      | 39.2       |
| <b>Prior educational attainment</b>                 |           |            |           |            |
| No qualification (%)                                | 18.9      | 17.8       | 9.4       | 16.4       |
| Lower school qualification (%)                      | 14.1      | 15.9       | 6.1       | 14.5       |
| Upper school qualification (%)                      | 11.2      | 13.9       | 4.5       | 15.0       |
| Post-school qualification level 1–3 (%)             | 13.7      | 9.4        | 12.0      | 9.2        |
| Post-school qualification level 4–6 (%)             | 25.6      | 24.1       | 38.1      | 24.7       |
| Degree or equivalent (%)                            | 15.3      | 17.3       | 29.3      | 18.4       |
| <b>Highest qualification prior to study was ...</b> |           |            |           |            |
| Lower (%)   | 44.2      |            | 38.5      |            |
| Same level (%)                                      | 13.7      |            | 25.1      |            |
| Higher (%)  | 42.1      |            | 36.4      |            |
| <b>Labour market indicators at wave 1</b>           |           |            |           |            |
| Mean weekly hours                                   | 37.1      | 38.7       | 39.5      | 40.1       |
| Months worked in year                               | 11.0      | 11.3       | 11.4      | 11.3       |
| Mean wage   | 18.4      | 20.5       | 20.3      | 20.5       |
| Mean weekly earnings                                | 691       | 782        | 777       | 812        |
| Mean monthly earnings                               | 2,967     | 3,368      | 3,355     | 3,493      |
| Log wage  | 2.84      | 2.90       | 2.93      | 2.91       |
| Log weekly earnings                                 | 6.33      | 6.47       | 6.52      | 6.52       |
| Log monthly earnings                                | 7.78      | 7.93       | 7.98      | 7.98       |
| <b>Labour market indicators at wave 7</b>           |           |            |           |            |
| Mean weekly hours                                   | 38.3      | 37.9       | 39.0      | 39.1       |
| Months worked in year                               | 10.6      | 10.7       | 10.6      | 10.7       |
| Mean wage   | 20.8      | 24.2       | 25.1      | 24.6       |
| Mean weekly earnings                                | 797       | 890        | 994       | 933        |
| Mean monthly earnings                               | 3,297     | 3,683      | 4,098     | 3,862      |
| Log wage  | 2.96      | 3.05       | 3.15      | 3.07       |
| Log weekly earnings                                 | 6.51      | 6.60       | 6.75      | 6.66       |
| Log monthly earnings                                | 7.93      | 8.02       | 8.16      | 8.07       |
| <b>Earnings growth from wave 1 to wave 7</b>        |           |            |           |            |
| Change in log wage                                  | 0.120     | 0.152      | 0.215     | 0.166      |
| Change in log weekly earnings                       | 0.179     | 0.130      | 0.230     | 0.138      |
| Change in log monthly earnings                      | 0.146     | 0.089      | 0.185     | 0.097      |

**Table 4.2:** Characteristics of the Survey of Families, Incomes and Employment (SoFIE) sample and comparison group, by gender and highest level of qualification gained

|   | Males     |            |           |            | Females   |            |           |            |
|---|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
|   | Level 1-3 |            | Level 4-6 |            | Level 1-3 |            | Level 4-6 |            |
|   | Students  | Comparison | Students  | Comparison | Students  | Comparison | Students  | Comparison |
| Sample size                                     | 65        | 2155       | 65        | 2155       | 115       | 2100       | 85        | 2100       |
| <b>Demographic characteristics</b>              |           |            |           |            |           |            |           |            |
| Mean age at wave 3                              | 39.2      | 39.5       | 38.2      | 38.5       | 43.5      | 43.3       | 39.7      | 40.0       |
| <b>Prior educational attainment</b>             |           |            |           |            |           |            |           |            |
| No qualification (%)                            | 18.5      | 17.7       | 15.3      | 17.6       | 19.2      | 18.0       | 8.5       | 15.3       |
| School qualification (%)                        | 26.8      | 26.0       | 6.2       | 26.2       | 24.2      | 32.4       | 16.2      | 32.8       |
| Post-school qualification level 1-3 (%)         | 12.5      | 7.4        | s         | 7.3        | 14.5      | 10.7       | 17.8      | 11.0       |
| Post-school qualification level 4-6 (%)         | 32.8      | 30.4       | 48.5      | 30.1       | 20.9      | 19.9       | 27.9      | 19.5       |
| Degree or equivalent (%)                        | 9.4       | 17.1       | 29.1      | 17.4       | 19.2      | 17.4       | 29.5      | 19.4       |
| <b>Comparison of new qualification with old</b> |           |            |           |            |           |            |           |            |
| Higher level (%)                                | 45.4      |            | 30.5      |            | 43.4      |            | 46.4      |            |
| Same level (%)                                  | 12.5      |            | 35.2      |            | 14.5      |            | 15.1      |            |
| Lower level (%)                                 | 42.2      |            | 34.2      |            | 42.1      |            | 38.6      |            |
| <b>Labour market indicators at wave 1</b>       |           |            |           |            |           |            |           |            |
| Mean weekly hours                               | 44.4      | 45.3       | 45.6      | 45.3       | 32.23     | 34.38      | 33.42     | 34.97      |
| Months worked in year                           | 11.2      | 11.4       | 11.4      | 11.3       | 10.8      | 11.2       | 11.3      | 11.2       |
| Mean wage                                       | 20.4      | 21.6       | 20.5      | 21.5       | 17.2      | 19.7       | 20.1      | 19.6       |
| Mean weekly earnings                            | 904       | 958        | 924       | 954        | 549       | 666        | 633       | 672        |
| Mean monthly earnings                           | 3,893     | 4,128      | 3,997     | 4,110      | 2,352     | 2,863      | 2,723     | 2,887      |
| Log wage  | 2.93      | 2.97       | 2.97      | 2.96       | 2.77      | 2.86       | 2.90      | 2.85       |
| Log weekly earnings                             | 6.70      | 6.74       | 6.76      | 6.74       | 6.09      | 6.29       | 6.29      | 6.30       |
| Log monthly earnings                            | 8.15      | 8.20       | 8.22      | 8.20       | 7.54      | 7.74       | 7.74      | 7.76       |

|  | Males     |            |           |            | Females   |            |           |            |
|--|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
|  | Level 1-3 |            | Level 4-6 |            | Level 1-3 |            | Level 4-6 |            |
|  | Students  | Comparison | Students  | Comparison | Students  | Comparison | Students  | Comparison |
| <b>Labour market indicators at wave 7</b>    |           |            |           |            |           |            |           |            |
| Mean weekly hours                            | 43.5      | 43.6       | 43.0      | 43.8       | 34.9      | 34.1       | 35.1      | 34.4       |
| Months worked in year                        | 10.9      | 10.8       | 10.8      | 10.8       | 10.3      | 10.7       | 10.4      | 10.6       |
| Mean wage                                    | 23.1      | 26.5       | 27.5      | 26.4       | 19.3      | 22.7       | 22.7      | 22.8       |
| Mean weekly earnings                         | 996       | 1,103      | 1,205     | 1,104      | 664       | 749        | 785       | 765        |
| Mean monthly earnings                        | 4,141     | 4,570      | 4,995     | 4,577      | 2,736     | 3,095      | 3,216     | 3,158      |
| Log wage                                     | 3.06      | 3.14       | 3.24      | 3.14       | 2.89      | 3.00       | 3.06      | 3.01       |
| Log weekly earnings                          | 6.78      | 6.87       | 6.98      | 6.87       | 6.33      | 6.42       | 6.53      | 6.45       |
| Log monthly earnings                         | 8.21      | 8.28       | 8.40      | 8.29       | 7.74      | 7.84       | 7.94      | 7.86       |
| <b>Earnings growth from wave 1 to wave 7</b> |           |            |           |            |           |            |           |            |
| Change in log wage                           | 0.133     | 0.172      | 0.274     | 0.176      | 0.112     | 0.139      | 0.156     | 0.157      |
| Change in log weekly earnings                | 0.085     | 0.125      | 0.221     | 0.131      | 0.241     | 0.134      | 0.239     | 0.144      |
| Change in log monthly earnings               | 0.056     | 0.083      | 0.179     | 0.090      | 0.206     | 0.093      | 0.191     | 0.104      |

Note: Estimates based on fewer than 40 students have been suppressed (s).

### 4.4.3 Comparison with the EOTE samples

The SoFIE and EOTE student samples are compared in Table 4.3. Within each qualification subgroup, the samples are broadly similar in their demographic composition, average months of employment per year, and average monthly earnings. The difference between the SoFIE and EOTE samples in mean months worked during the post-study year is due to differences in our sample selection rules (we required that employees in the EOTE sample were employed for at least six months but we relaxed this criterion to one month for the SoFIE sample).

**Table 4.3:** Comparison of Survey of Families, Incomes and Employment and Employment Outcomes of Tertiary Education samples

|  | SoFIE     |           | EOTE      |         |           |
|--|-----------|-----------|-----------|---------|-----------|
|  | Level 1-3 | Level 4-6 | Level 1-3 | Level 4 | Level 5-6 |
| Percent female (%)                               | 60.0      | 53.1      | 60.8      | 61.5    | 59.7      |
| Mean age (years)                                 | 40.8      | 38.5      | 38.8      | 39.9    | 36.5      |
| Pre-study average months of employment per year  | 10.5      | 10.9      | 10.3      | 10.9    | 10.6      |
| Post-study average months of employment per year | 10.6      | 10.6      | 11.4      | 11.5    | 11.5      |
| Pre-study average monthly earnings (\$)          | 2,802     | 3,181     | 2,820     | 3,340   | 3,300     |
| Post-study average monthly earnings (\$)         | 3,215     | 3,924     | 3,350     | 3,840   | 4,000     |
| Average annual earnings growth (%)               | 2.5       | 3.9       | 3.8       | 3.0     | 4.2       |

Notes: Survey of Families, Incomes and Employment (SoFIE) includes level 1-4 qualifications that were obtained through industry training, as well as qualifications that were obtained in tertiary education institutions. The Employment Outcomes of Tertiary Education (EOTE) results include only qualifications obtained in tertiary education institutions.

## 4.5 Results: estimates of the impact of gaining a qualification

The impact estimates obtained from the SoFIE analysis are presented in Table 4.4 (for level 1-3 qualifications and level 4-6 qualifications separately). Each table is divided into three main sections, giving the results for each measure of earnings growth (hourly, weekly, or monthly). Within each section, the estimates shown in different rows were obtained using different sets of explanatory variables to control for possible differences between the study population and comparison groups. We also give results for both genders combined and for males and females separately.

We begin by discussing the overall size of the impact estimates. Secondly, we compare the results obtained using the different measures of earnings. Thirdly, we compare the results obtained using different model specifications – with and without controls for prior educational attainment, and with and without controls for prior labour market outcomes.

**Table 4.4:** Estimated impact of gaining a qualification on the change in log earnings, main Survey of Families, Incomes and Employment results

|                                 |   | All           |       | Males  |       | Females       |       |
|---------------------------------|---|---------------|-------|--------|-------|---------------|-------|
|                                 |   | Est           | SE    | Est    | SE    | Est           | SE    |
| <b>Level 1–3 qualifications</b> |   |               |       |        |       |               |       |
| <b>Hourly earnings</b>          | No controls   | -0.032        | 0.029 | -0.039 | 0.042 | -0.027        | 0.037 |
|                                 | Age, gender   | -0.032        | 0.030 | -0.040 | 0.043 | -0.028        | 0.037 |
|                                 | Age, gender, qualifications   | -0.034        | 0.030 | -0.036 | 0.043 | -0.032        | 0.038 |
|                                 | Age, gender, prior months employment, prior earnings level              | <b>-0.056</b> | 0.026 | -0.050 | 0.036 | -0.065        | 0.035 |
|                                 | Age, gender, qualifications, prior months employment and prior earnings | <b>-0.059</b> | 0.025 | -0.037 | 0.034 | <b>-0.078</b> | 0.032 |
| <b>Weekly earnings</b>          | No controls   | 0.049         | 0.042 | -0.040 | 0.045 | 0.107         | 0.064 |
|                                 | Age, gender   | 0.049         | 0.042 | -0.043 | 0.046 | 0.112         | 0.062 |
|                                 | Age, gender, qualifications   | 0.044         | 0.043 | -0.040 | 0.047 | 0.108         | 0.064 |
|                                 | Age, gender, prior months employment, prior earnings level              | -0.009        | 0.038 | -0.056 | 0.042 | 0.018         | 0.057 |
|                                 | Age, gender, qualifications, prior months employment and prior earnings | -0.013        | 0.036 | -0.044 | 0.043 | 0.004         | 0.055 |
| <b>Monthly earnings</b>         | No controls   | 0.057         | 0.042 | -0.027 | 0.045 | 0.113         | 0.063 |
|                                 | Age, gender   | 0.058         | 0.042 | -0.030 | 0.047 | 0.118         | 0.062 |
|                                 | Age, gender, qualifications   | 0.053         | 0.043 | -0.028 | 0.047 | 0.115         | 0.063 |
|                                 | Age, gender, prior months employment, prior earnings level              | -0.007        | 0.037 | -0.047 | 0.043 | 0.016         | 0.055 |
|                                 | Age, gender, qualifications, prior months employment and prior earnings | -0.010        | 0.036 | -0.035 | 0.044 | 0.003         | 0.054 |
| <b>Sample sizes</b>             | Study population  | 180           |       | 65     |       | 115           |       |
|                                 | Control group   | 4,255         |       | 2,155  |       | 2,100         |       |
| <b>Level 4–6 qualifications</b> |   |               |       |        |       |               |       |
| <b>Hourly earnings</b>          | No controls   | 0.049         | 0.050 | 0.099  | 0.068 | -0.001        | 0.078 |
|                                 | Age, gender   | 0.048         | 0.049 | 0.098  | 0.065 | -0.003        | 0.077 |
|                                 | Age, gender, qualifications   | 0.029         | 0.047 | 0.072  | 0.064 | -0.018        | 0.076 |
|                                 | Age, gender, prior months employment, prior earnings level              | 0.058         | 0.042 | 0.098  | 0.061 | 0.024         | 0.057 |
|                                 | Age, gender, qualifications, prior months employment and prior earnings | 0.013         | 0.041 | 0.049  | 0.062 | -0.016        | 0.055 |
| <b>Weekly earnings</b>          | No controls   | 0.092         | 0.053 | 0.090  | 0.070 | 0.094         | 0.087 |
|                                 | Age, gender   | 0.089         | 0.053 | 0.086  | 0.064 | 0.095         | 0.088 |
|                                 | Age, gender, qualifications   | 0.082         | 0.051 | 0.064  | 0.064 | 0.090         | 0.088 |
|                                 | Age, gender, prior months employment, prior earnings level              | 0.090         | 0.047 | 0.089  | 0.067 | 0.088         | 0.067 |
|                                 | Age, gender, qualifications, prior months employment and prior earnings | 0.043         | 0.047 | 0.043  | 0.069 | 0.042         | 0.068 |
| <b>Monthly earnings</b>         | No controls   | 0.088         | 0.057 | 0.090  | 0.069 | 0.086         | 0.097 |
|                                 | Age, gender   | 0.085         | 0.057 | 0.086  | 0.064 | 0.087         | 0.098 |
|                                 | Age, gender, qualifications   | 0.078         | 0.055 | 0.063  | 0.064 | 0.083         | 0.097 |
|                                 | Age, gender, prior months employment, prior earnings level              | 0.087         | 0.049 | 0.091  | 0.067 | 0.080         | 0.074 |
|                                 | Age, gender, qualifications, prior months employment and prior earnings | 0.041         | 0.050 | 0.045  | 0.069 | 0.036         | 0.074 |
| <b>Sample sizes</b>             | Study population  | 150           |       | 65     |       | 85            |       |
|                                 | Comparison group  | 4,255         |       | 2,155  |       | 2,100         |       |

#### **4.5.1 Size of the impact estimates**

Our preferred estimates are those in the final row of each section of the tables. They represent the total change in earnings, over a six-year period, that can be attributed to the fact that a qualification was obtained. They range from an 8 percent decrease in the hourly earnings of women who gained a level 1–3 qualification to a 5 percent increase in the hourly earnings of men who gained a level 4–6 qualification. Some of the estimates are negative, indicating that the students had lower earnings growth over the observation period than the matched non-students.

As expected, most of these results are statistically imprecise and have large 95 percent confidence intervals. For example, the estimate of the impact of study on the hourly earnings of students who gained a level 1–3 qualification is -0.059 or minus 6 percent. It has a standard error of 0.025, which indicates that the 95 percent confidence interval around this estimate ranges from -0.107 (or minus 10.7 percent) to -0.01 (or minus 1 percent). In this case, we can be reasonably confident that the true estimate is below zero. In most other cases we cannot tell with confidence whether the true impact was negative, zero, or positive.

#### **4.5.2 Alternative measures of earnings**

For women, the estimated impact of studying on monthly and weekly earnings is consistently much higher than the estimated impact on hourly earnings. This reflects the fact that for the women in the SoFIE sample, gaining a qualification was associated with a significant increase in average hours of work. Women who gained a level 1–3 qualification increased their mean weekly hours by around 2.5 hours on average, while those who gained a level 4–6 qualification increased their mean hours by around 1.5.

These patterns are not present in the male results. There are only small differences between the results obtained using the different measures of earnings for men. The average weekly hours of the men in the study population were similar to those of the men in the comparison group at wave 1, and this did not change at wave 7.

The results for women indicate that measures of earnings growth that are affected by changes in hours of work (such as weekly or monthly earnings) do not always give a good indication of the direction or size of the change in hourly earnings that has occurred. In the case of women who completed a level 1–3 qualification, for example, the monthly and weekly figures suggest that studying had a small positive impact, while the hourly earnings results suggest studying had a small negative impact.

#### **4.5.3 Alternative model specifications**

For each measure of earnings and each student subgroup, we show five sets of results. The first row gives the results obtained from a model with no explanatory variables other than an indicator for having obtained a qualification, and simply shows the unadjusted mean difference in log earnings growth between the treatment and comparison groups. For example, the first number in the first row of Table 4.4 indicates that the hourly earnings growth of all

students who completed a level 1–3 qualification, over a six year period from 2001–2003 to 2007–2009, was -0.03 or 3 percent lower than the hourly earnings growth of the comparison group workers.

The second row of each section of the table gives results from a regression in which age, age squared, and gender controls were included. This makes little difference to the estimates of the effect of gaining a qualification on earnings growth, as age and gender effects on earnings growth were already accounted for through the re-weighting of the comparison group sample to make its age and gender profile match that of the study group.

The results in the third row are from a regression that also includes information on each individual's highest qualification before the study period, so that the earnings growth of the students is compared with the earnings growth of similarly qualified non-students. Prior educational attainment is likely to be correlated with unmeasured dimension of ability or skill, and if more skilled or more able individuals tend to have faster earnings growth than less skilled or less able individuals regardless of whether they undertake further education, we need to take that base relationship into account and compare like with like.

In practice, the impact of including a control for prior education is very minor or non-existent in the results for students who gained a level 1–3 qualification. This reflects the fact that there is very little difference between the educational profiles of the study population and comparison group workers, so little to adjust for. Controlling for prior educational attainment has a larger impact on the results for those who gained a level 4–6 qualification, reflecting that they were more qualified than workers who did not undertake further education. The direction of the impact is to reduce the estimated 'benefit' of the qualification. For example, the impact estimate for the hourly earnings of men and women combined is reduced from 4.8 percent to 2.9 percent.

The results in the fourth row of each section of the table were obtained by including measures of employment continuity and level of earnings before the study episode, but no control for prior educational attainment. Specifically, we include a measure of weeks worked and a measure of hourly, weekly, and monthly earnings during the wave 1 reference year. This is similar to the approach that was used to match students with comparison group individuals in the EOTE analysis.

There are at least two reasons why it is relevant to compare individuals who have similar labour market outcomes before further education is undertaken. First, variations in individuals' earnings may be correlated with underlying differences in ability or skill. If so, it is important to compare similarly skilled individuals when assessing the impact of further education. Second, as discussed previously, earnings are subject to transitory volatility as well as longer-run trends. Events such as job loss, the birth of a child, or an overseas trip can temporarily reduce a worker's earnings. Workers who have unusually low earnings in a particular period will tend to return to their longer-run earnings growth path subsequently, with the result that they have faster than average earnings growth in the short to medium term. This phenomenon is often described as 'regression to the mean'. If people who return to further education often do so in response to an event or situation that causes a temporary upward

or downward shock in their level of earnings, it is appropriate to compare them with workers whose earnings are also temporarily different from usual.

Including measures of prior employment continuity and earnings level in the regression models has a reasonably substantial effect on the impact estimates for adults who gained level 1–3 qualifications, reducing their size. There is a strong inverse correlation between initial earnings and subsequent earnings growth in both the student sample and the comparison group sample. Individuals with relatively low earnings initially tended to have faster earnings growth over the study period than those whose earnings were relatively high initially, and vice versa. As noted above, the level 1–3 students had lower earnings than the comparison group workers at wave 1. Comparing them to other workers who also had low earnings at wave 1 leads to lower estimates of the benefits of gaining a qualification, because working adults in this situation had relatively rapid earnings growth regardless of whether or not they undertook further education.

While an inverse correlation between initial earnings and subsequent earnings growth can also be found among the students who gained a level 4–6 qualification, controlling for prior employment continuity and prior level of earnings has much less effect on the impact estimates for this group. This is because the earnings distributions of the student and comparison groups at wave 1 were fairly close to each other.

Finally, the results in the fifth row of each section of the table are from regressions that include controls for both prior educational attainment and prior labour market performance. In general, these estimates of the impact of gaining a qualification on earnings growth are a little lower than those obtained in the previous model variants.

In other results, we also included information on ethnic group, country of birth, and years lived in New Zealand. Including these variables did not materially alter our estimates of the effects of gaining a qualification on earnings growth. For simplicity, we did not include them in the regressions reported here.

#### **4.5.4 Additional results on educational attainment patterns**

Further evidence on the pre-study educational levels of mature students is given by an analysis of the existing qualifications of *all* adults aged 25–64 who reported that they had obtained a new post-school qualification during the SoFIE observation window (from wave 2 to wave 7). This analysis uses a broader sample that includes adults who were self-employed, unemployed, or not in the labour force. As shown in Table 4.5, about 60 percent of this sample were already qualified at the level of their new qualification or at a higher level in the year before completing the new qualification, so only around 40 percent raised their level of educational attainment by returning to tertiary education.



**Table 4.5:** Highest prior qualification of people aged 25–64 who gained post-school qualifications in waves 2–7, Survey of Families, Incomes and Employment results

|   | Level of the new qualification |                    |                          |                     |                      |
|---|--------------------------------|--------------------|--------------------------|---------------------|----------------------|
|   | Basic vocational               | Skilled vocational | Inter-mediate vocational | Advanced vocational | Degree or equivalent |
| <b>Highest level of education prior to study</b>  |                                |                    |                          |                     |                      |
| No qualifications                                 | 13.6                           | 9.5                | 7.5                      | 3.8                 | 1.4                  |
| School qualification                              | 18.5                           | 20.5               | 22.8                     | 11.1                | 15.1                 |
| Basic vocational                                  | 21.4                           | 13.3               | 27.4                     | 14.1                | 5.7                  |
| Skilled vocational                                | 9.4                            | 19.7               | 9.0                      | 8.1                 | 3.0                  |
| Intermediate vocational                           | 3.5                            | 4.7                | 9.6                      | 2.4                 | 1.0                  |
| Advanced vocational                               | 15.7                           | 13.6               | 11.1                     | 31.1                | 13.4                 |
| Degree or equivalent                              | 16.6                           | 16.4               | 10.7                     | 28.2                | 59.4                 |
| Total   | 100.0                          | 100.0              | 100.0                    | 100.0               | 100.0                |
| <b>Highest qualification before study was ...</b> |                                |                    |                          |                     |                      |
| Lower   | 32.1                           | 43.4               | 66.8                     | 39.4                | 39.5                 |
| Same  | 21.4                           | 19.7               | 9.6                      | 31.1                | 59.4                 |
| Higher  | 45.2                           | 34.7               | 21.9                     | 28.2                | N/A                  |
| Sample size                                       | 770                            | 160                | 95                       | 405                 | 2,040                |

## 4.6 Summary of findings

As we expected, the SoFIE analysis did not generate estimates of the impact of studying that could be used with confidence due to the small numbers of adults who gained further qualifications in the SoFIE sample. The confidence intervals around each estimate are wide and indicate that the true impacts of study may have been negative or positive.

One of the most useful findings of this analysis is that employees aged 25 and over who complete a level 1–3 qualification are more highly educated than is often assumed. These qualifications were designed for people who did not complete their secondary education, but in the SoFIE sample only about one-third of the adults who completed qualifications at this level were unqualified or had only a lower school qualification before they began. When we examined the educational profile of all certificate and diploma students we found that only around 40 percent of the adults who completed a level 1–6 qualification between wave 2 and wave 7 raised their highest level of educational attainment as a result of the new qualification. If further study does not make workers more highly qualified, it is perhaps not surprising if the labour market impacts of this further study are limited.

Including information on individuals' prior educational attainment in our regression models to control for this source of variation in their subsequent earnings growth had much less impact than we expected. There was almost no change in the estimates for students who obtained a level 1–3 qualification, due to their pre-study educational profile being similar to that of the comparison group. In the case of students who completed a level 4–6 qualification, including

a control for prior qualifications had a small downward impact on our estimates of the benefits of completing a new qualification. This set of results suggests that the omission of educational attainment from the EOTE analysis is not a serious shortcoming in practice. While it is preferable to control for differences across individuals in their educational attainment, doing so does not hugely change the results obtained, at least for this particular study population.

Including a measure of pre-study earnings level in the control variables did not have much impact on the estimates for level 4–6 qualifications, but it substantially lowered the earnings benefits estimated for level 1–3 qualifications, particularly for women. This is because students who obtained level 1–3 qualifications had relatively low earnings at the start of the observation period (taking into account their age, gender, and prior qualifications) and their subsequent rate of earnings growth was influenced by this low starting point. If we compare them with workers who also had low earnings at the start, their subsequent rate of earnings growth was less unexpected. We conclude that taking students' pre-study labour market situation into account can materially affect estimates of the benefits of further study, although it does not always do so.

Finally, we found that for women who obtained new qualifications, models that focused on weekly or monthly earnings growth showed much larger 'benefits' than models using hourly earnings. The SoFIE results indicate that the women in our samples did not gain any wage benefits from studying. They increased their hours of work, leading to faster weekly and monthly earnings growth than was experienced by the comparison group. That increase in hours may or may not have been due to the qualification. Users of the EOTE data rely on changes in average monthly earnings (or annual earnings) to identify the impacts of education. The SoFIE results indicate that changes in this variable can be totally driven by changes in hours worked, so it does not always give a useful indication of the likely direction or size of the underlying change in wages.

## 5 CONCLUSION

This study has examined the impact of further study at certificate and diploma level on the earnings of 25–64-year-old students. It focused on students with employment experience in the 3 years before enrolment who completed a qualification at a tertiary education provider in 2003–2005. The main finding is that only a small proportion of the students in this study population had improved their relative earnings (compared with the earnings of a matched comparison group of working adults who did not return to study) by three years after completion.

Considered by the level of the qualification and gender, the main impact estimates were somewhat varied. Women who obtained a diploma (levels 5–6) were the largest group with a positive result on average. Their monthly earnings were on average 8 percent higher than those of the matched comparison group in the third year after completion. Women who completed certificates at levels 1–3 or level 4 did not significantly improve or reduce their relative earnings. Although the improvement in the relative earnings of female diploma graduates is a strong result, it is likely to be partly, and perhaps fully, the product of an increase in average hours of work, which in turn could be due to a voluntary labour supply adjustment rather than an improvement in employability.

Men who completed a level 1–3 certificate or a diploma experienced slower earnings growth on average than the men in their matched comparison groups who did not return to study, so their monthly earnings were 5 percent and 7 percent lower three years after completion. Men who completed a certificate at level 4 did not significantly improve or reduce their relative earnings. Further analysis indicated that the poorer results for level 1–3 certificate and diploma graduates were driven by the outcomes of a minority of men who had significant breaks in their employment before or during the study spell. When we restricted the sample to men who worked continuously or near continuously (the vast majority), the results indicated that completing a certificate or diploma had no significant impact on male earnings on average. The association of employment interruptions with lower earnings growth could be due to several factors, including the adverse effects of employment breaks on work experience and career advancement, industry and occupation effects on post-study earnings, and differences in the unmeasured characteristics of the students and non-students that were not fully controlled for in the analysis.

Students in some fields of study, such as diploma graduates in engineering, business and management, and teacher education, experienced significant earnings benefits while students in other fields, such as those obtaining certificates or diplomas in the food, hospitality, and personal services field, experienced significant earnings penalties. Several factors could be contributing to these field of study variations, including differences in hours of work changes before and after study, the effects of industry wage differentials on students' post-study earnings, and the effects of differences in the unmeasured characteristics of students and non-students that were not controlled for in the analysis.

That we could not examine changes in employees' hourly earnings in the main set of results (using the Employment Outcomes of Tertiary Education (EOTE) data) is one of the most important limitations of this study, given that changes in monthly earnings are affected by changes in hours of work as well as changes in wage rates. In the supplementary results obtained from an analysis of data from the Survey of Families, Incomes and Employment (SoFIE), we found that women who completed a diploma or level 4 certificate improved their relative weekly and monthly earnings but did not improve their relative wages. The improvements in weekly and monthly earnings were due to an increase in hours worked. An increase in hours could be facilitated by a new qualification, in which case it could legitimately be counted as one of the benefits. However, an increase in hours could also be pre-planned and independent of the qualification, and if so, the inclusion of the effects of hours of work adjustments in our main EOTE estimates would lead to an overstatement of the benefits of further education.

Prior educational attainment is an omitted variable in our main, EOTE-based analysis. We explored the implications of this omission in the supplementary analysis. Incorporating information on workers' prior level of educational attainment into the impact models (so that students were being compared with similarly qualified non-students) did not alter our estimates of the impact of gaining a level 1–3 qualification, and slightly lowered our estimates of the impact of gaining a level 4–6 qualification. We conclude that the omission of prior education from the case-matching in the main analysis probably did not lead to any substantial underestimation of the average benefits of further study.

However, not having a measure of prior educational attainment in EOTE was a disadvantage in other respects. If we had had a complete picture of the school and post-school qualifications that each individual held, it would have been possible to explore the extent to which the impacts of gaining further qualifications vary according to a person's existing education level. Overseas research has found that these variations may be important: post-school qualifications that do not improve the employment or earnings of the majority of recipients may still benefit particular groups, such as learners without prior academic qualifications or learners with lower than average academic ability (Dearden et al, 2000; Jenkins et al, 2002).<sup>17</sup>

Another limitation is that the main results in this paper consider outcomes only in the three years after the qualification was completed, only. This is due to the time span covered by the EOTE data set at the time the study was undertaken. Research conducted in other countries has indicated that the impacts of further education on earnings may take longer than three years to become fully apparent.<sup>18</sup> It is possible that some of the students in our current study who had not benefited after three years were in fact better off after more time had passed, allowing them to overcome any short-run negative effects of studying on

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<sup>17</sup> Dearden et al (2000) found that certain vocational qualifications seem to have a higher pay off for lower-ability individuals than high-ability individuals. Jenkins et al (2002) found that individuals with no prior qualifications gained wage increases after studying for a qualification when in their 30s, while individuals who already held qualifications did not.

<sup>18</sup> Future studies using EOTE could include more years of data.

earnings growth and benefit more fully from the skills acquired in the latest spell of education. However, when we compared the monthly earnings growth paths of the students in our study population and their matching comparison groups (Figures 3.2 and 3.3), there was not much visual indication of 'catch-up' trends that might result in students' earnings exceeding those of their comparison groups at a later date, with the exception perhaps of males who completed diplomas.

Several factors may have contributed to our failure to find evidence of more widespread earnings benefits. Students studied for relatively short periods, 1–1.5 years on average, and short spells of education are probably less likely to raise earnings than longer ones because the impact on knowledge and skills is also more limited. Evidence from SoFIE indicates that a large proportion of students aged 25–64 who complete a certificate or diploma are already qualified at an equivalent or higher level of education, and this is likely to reduce the likelihood that they will gain labour market rewards as a result. Another relevant observation is that around one-quarter to one-third of the students in our study population were still working for their pre-study employer at the time we measured their post-study outcomes. Those who did not change their employer may have had limited opportunity to gain significant wage increases.

Research on the returns to level 1–4 qualifications gained through workplace-based industry training also found quite limited evidence of post-study earnings benefits (Crichton, 2009). Our failure to find evidence of more widespread earnings benefits in the current paper is broadly consistent with the findings of research on post-school qualifications below degree level in Britain and Australia.

## **APPENDIX: PROFILE OF OLDER STUDENTS WHO ENROL AT A TERTIARY INSTITUTION**

As background to the analysis in this paper, this appendix provides a brief profile of all mature students and their study patterns. The purpose is to highlight the main ways in which mature students differ from younger students.

For illustrative purposes we use 2003 data and select all individuals who began a new spell of tertiary education in that year after a break from studying of at least 12 months, and enrolled for at least 0.25 equivalent full-time years of study (EFTS). The 0.25 EFTS threshold is roughly equivalent to 2–3 months of full-time study. We exclude those who enrolled for less than this because very short programmes (such as certificates in occupational health and safety) are unlikely to have a significant labour market impact.<sup>19</sup> Our definition of a 'new' spell of tertiary education includes students who were returning to complete a qualification that they had begun earlier, if separated by a gap of at least one year. We exclude international students and those undertaking industry training.

In 2003, about 56 percent of all students who were beginning a new spell of tertiary education were aged 25 or over (that is, were 'mature-aged students'). Fifty-six percent of the mature students were women. The majority of the mature students (59 percent) were aged 25–39, and the other 40 percent were aged 40–64. Only 1 percent were aged 65 or over.<sup>20</sup>

Information on enrolment patterns is summarised in Table A. Mature students who started in 2003 were less likely than younger students to enrol at a university or a private training establishment, but were more likely to enrol at a wānanga. The duration of the spells of tertiary study that were begun in 2003 varies to some extent by age. Mature students typically studied for shorter periods. Only 29 percent studied for more than two years, compared with nearly half of those who enrolled before the age of 20.

By the end of 2008, approximately 48 percent of the mature students who began a spell of study in 2003 had completed a qualification. This was lower than the qualification completion rate of students who started at 15–19 years (58 percent), but slightly above that for those who started while aged 20–24 (45 percent).

The mix of qualifications obtained also varied by age. Mature students were less likely to complete degrees than those aged 15–24 at the time of enrolment and more likely to complete certificates, especially level 4 certificates.

While most young students studied mainly on a full-time basis (86 percent), mature students studied mainly on a part-time basis (55 percent).

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<sup>19</sup> In 2003, 27 percent of all new enrolments were in programmes of study with a total EFTS value under 0.25. Of those who enrolled for these short courses, 47 percent completed a qualification. Of the qualifications that were completed, 53 percent were certificates in occupational health and safety.

<sup>20</sup> Students who were aged 65 or over when they enrolled are not included in the main study population for this paper.

Mature students were also more likely to work while studying. Thirty-eight percent were employed in a waged or salaried job for every month of their study spell and 56 percent were employed for at least half the time. However, a significant minority of mature students (26 percent) did not undertake paid work at all while studying.

Summarising, one key difference between younger and mature students is that mature students are more likely to study towards a certificates and diplomas and less likely to study for a degree. Another is that mature students are much more likely to study on a part-time basis. Mature students are also more likely to work while studying.

**Table A:** All those who started a study spell in 2003 and enrolled for at least 0.25 effective full-time years of study during the study period

|  | 15–19<br>years | 20–24<br>years | 25–34<br>years | 35–44<br>years | 45–54<br>years | 55–64<br>years | 65+<br>years | Total<br>15+<br>years | Females<br>25–64<br>years | Males<br>25–64<br>years | Total 25–<br>64 years |
|--|----------------|----------------|----------------|----------------|----------------|----------------|--------------|-----------------------|---------------------------|-------------------------|-----------------------|
| <b>Institution</b>   |                |                |                |                |                |                |              |                       |                           |                         |                       |
| University   | 38.9           | 28.4           | 26.1           | 21.4           | 21.7           | 17.0           | 9.9          | 28.3                  | 23.3                      | 22.9                    | 23.2                  |
| Polytech or technical institute  | 34.3           | 35.4           | 33.0           | 34.1           | 29.8           | 23.9           | 12.4         | 33.1                  | 30.6                      | 35.0                    | 32.2                  |
| Wānanga  | 2.9            | 14.6           | 22.2           | 29.9           | 36.0           | 47.5           | 70.1         | 19.8                  | 31.1                      | 25.3                    | 29.0                  |
| Private training establishment   | 23.9           | 21.6           | 18.6           | 14.6           | 12.5           | 11.6           | 7.8          | 18.8                  | 15.0                      | 16.8                    | 15.7                  |
| <b>Study spell duration (from start to end)</b>                          |                |                |                |                |                |                |              |                       |                           |                         |                       |
| 3–6 months   | 10.6           | 13.3           | 10.8           | 9.0            | 8.6            | 8.7            | 6.4          | 10.4                  | 8.3                       | 12.0                    | 9.7                   |
| 7–12 months  | 25.7           | 33.8           | 35.7           | 35.5           | 36.0           | 40.1           | 46.6         | 32.8                  | 36.0                      | 35.9                    | 36.0                  |
| 13–24 months   | 15.7           | 21.8           | 24.5           | 25.4           | 27.2           | 27.6           | 28.9         | 22.2                  | 24.9                      | 26.6                    | 25.5                  |
| 25–36 months   | 13.6           | 14.2           | 14.0           | 13.7           | 13.5           | 11.6           | 8.6          | 13.7                  | 14.2                      | 12.8                    | 13.7                  |
| 37–48 months   | 14.9           | 8.0            | 6.9            | 7.3            | 6.5            | 5.7            | 4.0          | 9.3                   | 7.5                       | 5.9                     | 6.9                   |
| 49 or more months  | 19.4           | 8.8            | 8.0            | 9.1            | 8.1            | 6.3            | 5.4          | 11.5                  | 9.1                       | 6.8                     | 8.3                   |
| <b>Level of qualification first enrolled in</b>                          |                |                |                |                |                |                |              |                       |                           |                         |                       |
| Level 1–3 certificate  | 42.8           | 45.8           | 44.1           | 44.8           | 41.9           | 44.9           | 50.7         | 44.0                  | 45.1                      | 41.9                    | 43.9                  |
| Level 4 certificate  | 11.1           | 11.8           | 14.8           | 19.9           | 24.2           | 28.6           | 32.3         | 15.9                  | 18.8                      | 19.9                    | 19.2                  |
| Diploma  | 10.2           | 15.1           | 15.8           | 13.8           | 12.2           | 10.3           | 7.0          | 13.1                  | 12.9                      | 16.1                    | 14.1                  |
| Bachelor's degree  | 33.8           | 22.7           | 14.6           | 11.3           | 9.8            | 7.0            | 6.5          | 19.8                  | 12.5                      | 11.5                    | 12.1                  |
| Level 7 graduate certificate/ diploma                                    | s              | 1.8            | 4.2            | 3.8            | 4.3            | 3.4            | 1.4          | 2.6                   | 4.1                       | 3.9                     | 4.0                   |
| Level 8 honours/postgraduate certificate/diploma                         | 2.0            | 1.9            | 4.1            | 3.8            | 4.3            | 3.1            | s            | 3.1                   | 4.1                       | 3.7                     | 4.0                   |
| Master's degree  | s              | s              | 2.1            | 2.2            | 2.7            | 2.1            | s            | 1.4                   | 2.1                       | 2.6                     | 2.2                   |
| Doctorate  | s              | s              | s              | s              | s              | s              | s            | 0.3                   | 0.4                       | 0.6                     | 0.5                   |
| Gained a qualification by December 2008                                  | 57.9           | 45.3           | 44.4           | 48.6           | 51.0           | 51.4           | 51.8         | 50.2                  | 50.3                      | 42.6                    | 47.5                  |
| <b>Level of highest qualification gained (if any by the end of 2008)</b> |                |                |                |                |                |                |              |                       |                           |                         |                       |
| Level 1–3 certificate  | 28.1           | 34.4           | 34.4           | 36.1           | 35.2           | 39.9           | 46.2         | 33.3                  | 36.1                      | 34.3                    | 35.5                  |
| Level 4 certificate  | 10.7           | 13.8           | 18.2           | 24.2           | 27.1           | 31.8           | 36.3         | 18.1                  | 22.4                      | 24.1                    | 23.0                  |
| Diploma  | 11.4           | 16.8           | 16.1           | 14.5           | 13.6           | 11.9           | 11.9         | 14.1                  | 14.3                      | 15.6                    | 14.7                  |
| Bachelor's degree  | 39.2           | 22.9           | 13.6           | 11.1           | 8.6            | 5.8            | 3.7          | 20.9                  | 12.1                      | 9.2                     | 11.2                  |
| Level 7 graduate certificate/ diploma                                    | 3.5            | 4.6            | 6.3            | 4.3            | 4.8            | 3.0            | 0.6          | 4.6                   | 5.0                       | 5.2                     | 5.1                   |
| Level 8 honours/postgraduate certificate/diploma                         | 7.7            | 5.0            | 7.0            | 6.0            | 6.4            | 4.3            | s            | 6.5                   | 6.4                       | 6.2                     | 6.4                   |
| Master's degree  | 1.3            | 2.4            | 4.0            | 3.5            | 3.8            | 2.8            | s            | 2.8                   | 3.2                       | 4.7                     | 3.7                   |
| Doctorate  | s              | s              | s              | s              | s              | s              | s            | 0.3                   | 0.4                       | 0.6                     | 0.4                   |
| N observations   | 33,270         | 17,480         | 27,280         | 21,900         | 12,790         | 4,090          | 940          | 117,740               | 42,000                    | 24,050                  | 66,050                |

Note: This table includes students who were not matched to Linked Employer–Employee Database. Estimates based on fewer than 40 students have been suppressed (s).



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