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The Labour Market Returns to Industry Training

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NOTES ON THE DATA

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.

The results are based in part on tax data supplied by Inland Revenue to Statistics New Zealand under the Tax Administration Act 1994. This tax data must be used for only statistical purposes, and no individual information is published or disclosed in any other form, or provided back to Inland Revenue for administrative or regulatory purposes.

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).

The opinions, findings, and conclusions expressed in this paper are those of the author; they do not purport to represent those of Statistics New Zealand, which takes no responsibility for any omissions or errors in the information contained here.

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ABSTRACT

A growing number of adults have been participating in industry training and gaining new qualifications. This paper investigates the labour market benefits that were obtained by working adults aged 20–64 who trained during 2003–2008.

The study focuses on people who were employed both before and after their spell of training and use longitudinal administrative data from the Employment Outcomes of Tertiary Education data set to estimate the impact of training on their subsequent average monthly earnings. A difference-in-difference approach is used to compare the earnings changes experienced by the trainees over the 1-year pre-training to the 1-year post-training period, with the changes experienced by a matched comparison group of working adults who did not participate in industry training over the same period.

About 40 percent of trainees in the study population completed a qualification (mostly at levels 2–4 on the New Zealand Qualifications Framework), and a further 10 percent completed a limited credit programme.

Trainees who did not complete a qualification and those who gained level 1 qualification did not experience any increase in earnings growth relative to the comparison group, over the pre-training to post-training period.

Trainees who completed a qualification at level 2 or above experienced earnings benefits and these generally increased as the level of the qualification increased. Level 2 qualifications were associated with a 3 percent increase in earnings growth on average, level 3 with a 5 percent increase, and level 4 with a 7 percent increase. Completing limited credit programmes was associated with a 2 percent increase in earnings growth on average.

New qualifications at level 2 and above were associated with earnings benefits for women and men, and all age groups. Those who gained a qualification in some fields experienced large improvements in earnings on average, while those in other fields experienced no significant improvement.

Some trainees were observed up to 3 years after they completed training. The earnings benefits associated with training were similar, or decreased slightly, over the 3 years. Including income from self-employment in the measure of earnings resulted in some small additional benefits 3 years afterwards for some groups of trainees, particularly those at level 3.

Participation in industry training requires continuing employment, and reflecting this, industry trainees were employed for a larger proportion of the training period than employees in the comparison group. Trainees who completed a qualification were also slightly more likely to be employed 1 year and 3 years after completing training. This positive impact on employment rates after training can be largely explained by, and attributed to, trainees' higher employment rates during the training period.

SUMMARY

This paper investigates the earnings benefits obtained by adults aged 20–64 who participated in industry training between January 2003 and December 2008.

A growing number of adults have been gaining new qualifications through industry training. Between 2003 and 2008, the number of people participating in training increased from 123,800 to 188,700, and the number who gained a qualification in 2003 and 2008 increased from 12,300 to 29,600. In 2008, two-thirds of new qualifications at levels 1–4 gained by men and one-fifth gained by women were gained through industry training rather than through tertiary education institutions.

This study focuses on those who began and completed a spell of training during 2003–2008, and were employed for at least 6 months during the year before training and for at least 6 months during the year after their training. About 40 percent of trainees in this study population completed a qualification (mostly at levels 2–4 on the New Zealand Qualifications Framework), and a further 10 percent completed a limited credit programme (mostly at levels 2–3).

The research uses longitudinal administrative data from the Employment Outcomes of Tertiary Education (EOTE) data set, which contains detailed information on participation, qualification attainment, and monthly earnings.

To estimate the impact of gaining a qualification, the changes in average monthly earnings experienced by the trainees over the 1-year pre-training to the 1-year post-training period are compared with the changes experienced by a matched comparison group of working adults who did not participate in industry training over the same period. For those who had completed training by the end of 2005, the change in earnings that was apparent by the third year after the trainees completed their qualifications is also analysed.

This study updates and extends a study completed in 2009, which examined the returns to qualifications gained through industry training during 2002–2005. There are methodological differences between the two studies. The main one is that this study primarily focuses on the impacts of training 1 year after completing training rather than approximately 3 years afterwards. This change means that returns to qualifications gained up to the end of 2008 can be examined. For those who gained qualifications during 2003–2005, the impacts 3 years post-training are directly comparable to results on the returns to level 1–6 qualifications gained through tertiary institutions over the same period ,which are reported in Crichton and Dixon, 2010.

Key findings

Gained a qualification at level 1

- On average, trainees who completed a level 1 qualification did not experience an improvement in earnings, relative to those of the comparison group, over the 1 year pre-training to 1 year post-training period.

Gained a qualification at level 2 and above

- Gaining a qualification at level 2 or above was associated with higher earnings growth for both men and women in all age groups.
- Gains generally increased as the level of the qualification increased. Those who gained a level 2 qualification experienced a 3 percent increase in earnings growth on average, level 3 a 5 percent increase, level 4 a 7 percent increase, and level 5 or above a 5 percent increase.[1]
- Women and men who gained a level 3 or 4 qualification experienced similar benefits, while women who gained a qualification at level 2 or level 5 and above experienced greater benefits than men.
- In some cases, younger age groups benefited more than older age groups, particularly those who gained level 4 qualifications.
- Trainees who gained a qualification in particular fields of study experienced substantial improvements in earnings on average, while those in others fields experienced no or only small benefits.

Completed a limited credit programme

- Completing a limited credit programme was associated with a 2 percent increase in earnings growth for both men and women on average.

Did not gain a qualification or complete a limited credit programme

- Trainees who did not gain a qualification or complete a limited credit programme did not experience an increase in earnings growth relative to the comparison group on average. This was the case for all programme levels and for both men and women on average.

Research question

This study addresses whether working adults who participate in industry training experience labour market benefits afterwards. It focuses on the impact of industry training on trainees' average earnings in the first year after the completion of training. For those who had completed training by the end of 2005, impacts in the third year after completion are also analysed. A more limited analysis of the impact on employment rates is also undertaken.

Further education and training 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 trainee's employability.

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

[1] Estimated impacts are the percentage difference in earnings growth over the 1-year pre-training to 1-year post-training period. The average training period was 12 months for those who gained level 1 or 2 qualifications, 18 months for those who gained level 3 qualifications, and 24 months for those who gained level 4 qualifications.

Data source

The 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.

Study population and methods

The main study population comprised people aged 20–64 who began and completed an episode of industry training between January 2003 and December 2008, had been working in waged or salaried employment during the year before their enrolment (for at least 6 months), and were employed in a waged or salaried job in the first or third year after the completion of the qualification (for at least 6 months). Detailed information is available on the monthly earnings of this study population during the 3 years before they began training, during the training period, and up to 4 years after the qualification was completed.

Approximately 60 percent of the trainees in the main study population were men, reflecting the sex mix of participants in industry training. About 70 percent of the trainees who successfully completed a qualification at level 4 or above were men, while 55 percent of those who completed a qualification at level 1 were men. About 20 percent of trainees were aged 20–24, 30 percent were aged 25–34, one-quarter aged 35–44, and the remaining one-quarter aged 45–64.

A comparison group was used to provide a counterfactual estimate of the employment and earnings changes that the study population members would have experienced if they had not undertaken further training. Comparison group members were non-trainees selected so that their demographic characteristics and their employment and earnings histories during the year before the trainees began training closely matched those of the study population members.

To estimate the impact of gaining a qualification, the growth in the trainees' average monthly earnings from the year before the training spell began to the year after completion is compared with the growth in the monthly earnings of the matched non-trainees over the same period. Those who gained a level 1 or 2 qualification typically trained for 6–12 months, while those who gained a level 4 or 5 qualification trained for 12–36 months. The pre-training to post-training period varied across programme level and trainee, but was approximately 2–3 years on average.[2]

Analysing those who began and completed an episode of industry training between January 2003 and December 2005 enables us to examine the impacts on earnings up to 3 years after the qualification was completed, and to include income from self-employment in the measure of earnings growth.

[2] The average training period was 12 months for those who gained level 1 or 2 qualifications, 18 months for those who gained level 3 qualifications, and 24 months for those who gained level 4 qualifications.

Changes in average monthly earnings are examined because a wage measure is not available in EOTE. Note that monthly earnings may be 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.

Main findings

Table S1 summarises our main estimates of the impact of gaining a qualification on average monthly earnings by sex, and sex and age group, obtained by comparing the earnings growth of the trainee and matched comparison groups.

These estimates represent the percentage difference in earnings growth that can be attributed to training, measured in the first year after completion of the qualification. That is, an increase in earnings relative to the comparison group, over the 1-year pre-training period to the 1-year post-training period. Positive numbers (that is, earnings premiums) indicate that the trainees had faster earnings growth during or after the completion of their training spell than the comparison group. Negative numbers (that is, earnings penalties) indicate slower earnings growth. Results shown in bold in the tables are statistically significant.

Trainees who completed a qualification at level 2 and above experienced greater earnings growth relative to the comparison group on average, and the gains generally increased as the level of the qualification increased. Level 2 qualifications were associated with a 3 percent increase in earnings growth over the one-year pre-training to post-training period, and level 4 qualifications were associated with a 7 percent increase.

Table S1: Estimated percentage impact on trainees' earnings growth by the first year after completion, by highest qualification gained, age, and sex

Highest qualification	Total	Male	Female	Male				Female			
				20–24 years	25–34 years	35–44 years	45–64 years	20–24 years	25–34 years	35–44 years	45–64 years
Level 1	**-1.1**	**-3.2**	1.3	0.3	**-4.3**	**-3.3**	**-3.9**	-2.3	**4.9**	-0.8	1.9
Level 2	**3.3**	**2.4**	**4.5**	**3.6**	**2.6**	**1.2**	**2.3**	1.4	**7.7**	**3.5**	**5.1**
Level 3	**5.1**	**4.5**	**5.9**	**6.9**	**4.3**	**3.9**	**4.3**	**6.5**	**7.7**	**4.0**	**5.1**
Level 4	**7.1**	**7.3**	**6.5**	**15.1**	**6.6**	**4.2**	**2.0**	**11.7**	**4.8**	**7.0**	**4.1**
Level 5+	**4.6**	**3.3**	**7.9**	s	**5.5**	**1.8**	**2.6**	s	**12.7**	4.8	**8.4**
LCP	**2.2**	**2.1**	**2.2**	2.8	**2.8**	**1.6**	**1.9**	**8.0**	-0.3	1.0	**2.6**
None	**-1.1**	**-1.3**	**-1.0**	**-1.3**	**-1.2**	**-1.2**	**-1.4**	**-2.0**	-0.3	-1.1	**-1.2**

Notes: Estimates in bold are statistically significant at the 5 percent level. Estimates based on fewer than 100 trainees have been suppressed (s). LCP = limited credit programme.

Gained a level 1 qualification

Men who completed a level 1 qualification experienced a small earnings loss relative to the comparison group. The size of the estimated loss was similar for the three older age groups at 3–4 percent, but men aged 20–24 did not significantly improve or reduce their earnings compared with the comparison group. Women who completed a level 1 qualification did not significantly improve or reduce their earnings compared with the comparison group, and this was true for women in all age groups except those aged 25–34 who experienced 5 percent greater earnings growth than the comparison group. The estimate for women aged 25–34 is subject to a margin of error at about +/- 4 percent.

Gained a level 2 qualification

Both men and women who completed a qualification at level 2 experienced greater earnings growth than did the comparison group on average. Women experience 4.5 percent higher earnings growth on average. Women aged 25–64 experience significantly higher earnings growth of 3–8 percent, but women aged 20–24 did not significantly improve their earnings growth compared with the comparison group. Men experienced 2.4 percent higher earnings growth on average, and men in all four age groups experienced significant improvements of 1–4 percent.

Gained a level 3 qualification

Men experienced 4.5 percent higher earnings growth and women 6 percent on average. Men and women in all age groups experienced significant improvements in earnings. The improvement was higher for men aged 20–24 and women aged 20–34 at about 7 percent, and lower for women aged 35–64 and men aged 25–64 at about 4 percent.

Gained a level 4 qualification

Men and women experienced a similar improvement in earnings growth on average at about 7 percent. Men and women in all age groups experienced significant improvements in their earnings, but the magnitude of the impact varied substantially by age. The earnings benefits were greatest for men and women aged 20–24 at about 15 percent and 12 percent respectively and lowest for men aged 45–64 at about 2 percent. Those who gained 240 credits or more experienced a 13 percent increase in earnings growth, while those who gained fewer than 60 credits experienced a 5 percent increase on average.

Gained a qualification at level 5 and above

Women experienced 8 percent higher earnings growth on average and men 3 percent on average. Relatively few trainees completed a qualification at this level and estimates for most sex–age are not precisely estimated. The results indicate that men and women aged 25–34 may have experienced greater earnings benefits than those aged 35–64, but differences by age within sex are not statistically significant.

Completed a limited credit programme

Both men and women who completed a limited credit programme experienced 2 percent greater earnings growth than the comparison group on average. Women aged 45–64 improved their earnings growth by 2.5 percent while those aged 25–44 did not experience any significant improvement. Women aged 20–24 improved their earnings growth by 8 percent on average, however there were relatively few trainees in this age-group and this estimate is subject to a margin of error of +/- 5 percent. Men in the all four age groups experienced improvements of about 2–3 percent, although in the case of those aged 20-24 this was not statistically significant.

Did not gain a qualification or complete a limited credit programme

On average both men and women who participated in industry training but did not gain a qualification or complete a limited credit programme experienced small earnings penalties relative to the comparison group, of about 1 percent. For women aged 20–24 the penalty was slightly greater at 2 percent, while women aged 25–44 experienced no significant effect. Men in all age four groups experienced an earning loss of about 1 percent.

Impacts greater for younger trainees but fairly similar for men and women

Within each level of qualification, the earnings benefits varied to some extent by age and sex. Gaining a new qualification was associated with earnings benefits for both women and men in nearly all age groups, although in some cases younger age groups benefited more than older age groups on average, particularly for those who gained a level 4 qualification.

Impacts on average earnings in the first year post training

The impact estimates in this study relate to impact of training on the change in the logarithm of average earnings over the 1-year pre-training to the 1-year post-training period. Estimates of the impact of training on average annual earnings in the year after completing training were also calculated. These two measures are not equivalent.

Gaining a level 2 qualification improved the annual earnings of women by $800 in the year after completing training on average (from $32,100 to $32,900), a level 3 qualification improved earnings by $1,150 (from $38,000 to $39,150), a level 4 qualification improved earnings by $1,500 (from $43,500 to $45,000), and gaining a qualification at level 5 or higher improved earnings by $2,600 on average (from $55,500 to $58,100).

Gaining a level 2 qualification improved the annual earnings of men by $600 on average (from $47,600 to $48,200), a level 3 qualification improved earnings by $1,250 (from $54,700 to $55,900), a level 4 qualification improved earnings by $2,600 (from $54,300 to $56,900), and gaining a qualification at level 5 or higher improved earnings by $1,900 on average (from $80,300 to $82,200). Completing a limited credit programme improved the annual earnings by $570 on average (from $51,150 to $51,700).

The earning benefits associated with gaining level 4 qualifications varied considerably by age and the number of credits gained. For example, gaining a level 4 qualification improved the annual earnings of men aged 20-24 when they started training by $5,000 in the year after completing training on average (from $42,600 to $47,600), the earnings of men aged 45 or more improved by $1,100 (from $62,800 to $63,900), the earnings of women aged 20-24 improved by $2,500 (from $35,400 to $37,900), and earnings of women aged over 45 and over by $800 on average (from $44,100 to $44,900). Completing a qualification which required 240 or more credits improved the annual earnings of men by $5,000 in the year after completing training on average (from $48,300 to $53,400).

Considerable variation in impacts by field of study

There was considerable variation in impacts by field of study, particularly for qualifications gained at level 4 or above. Table S2 reports results that met the confidentiality and minimum sample size requirements for release. Because relatively few industry training organisations offer qualifications at level 1, confidentiality requirements mean that estimates by field of study for this level cannot be released.

Those who completed a qualification at level 5 or above in the society and culture field did not experience any earning benefits on average, while those with a qualification in management and commerce or in engineering and related technologies improved their earnings growth by 7 percent and 5 percent respectively.

Those who completed a level 4 qualification in the society and culture field did not experience any earnings benefits on average, while trainees with a qualification in agriculture and environment, building and architecture, or engineering and related technologies improved their earnings by 9–12 percent. Trainees who gained a qualification in any of the three other fields that could be separately reported improved their earnings by 5–7 percent.

Table S2: Estimated percentage impact on trainees' earnings growth by the first year after completion, by highest qualification gained and major field of study

Major field of study	Level 2	Level 3	Level 4	Level 5+
Science	s	s	s	s
Information technology	s	s	s	s
Engineering and related technologies	**3.8**	**6.4**	**9.5**	**5.0**
Architecture and building	s	**5.6**	**9.4**	s
Agriculture and environment	**3.0**	**3.9**	**6.2**	s
Health	s	**5.1**	**12.0**	s
Education	s	s	s	s
Management and commerce	s	**5.0**	**4.5**	**7.5**
Society and culture	s	**2.9**	0.7	1.6
Creative arts	s	s	s	s
Food, hospitality & personal services	**2.0**	**7.1**	**6.5**	s
Employment & social	s	s	s	s
Total	**3.4**	**5.1**	**7.1**	**4.6**

Notes: Estimates in bold are statistically significant at the 5 percent level. Estimates that do not meet confidentiality requirements or are based on fewer than 100 trainees have been suppressed (s).

Those who completed a level 3 qualification in society and culture or agriculture and environment improved their earnings growth by 3–4 percent. Those who gained a qualification in health or management and commerce improved their earnings by 5 percent. Those who gained a qualification in food, hospitality and personal services, in engineering and related technologies, or in architecture and construction improved their earnings by 6–7 percent.

Only three fields could be separately reported at level 2, and those who completed a level 2 qualification in food, hospitality and personal services, agriculture and environment, or engineering and related technologies experienced a similar improvement in earnings growth of 2–4 percent.

Improvements in trainees' earnings due in part to more work experience

Participation in industry training requires continuing employment, and reflecting this, industry trainees were employed for a larger proportion of the training period than employees in the comparison group. Learning through work experience is one of the potential sources of wage growth for both industry trainees and people who are not in formal training arrangements. The difference between industry trainees and the comparison group employees in months of work experience during the training period accounts for about one-third of the earnings impact experienced by women, but only a small proportion of the earnings impact experienced by men.

This analysis suggests that some of the earnings growth experienced by industry trainees (particularly women) is due to the effects of higher employment continuity, as distinct from structured teaching and learning.

Impacts of training on employment

As well as being employed for nearly all of the training period, trainees were more likely than individuals in the comparison group to be employed 1 year after completing training. Employment rates were 2–6 percentage points higher for trainees than for the comparison group, depending on the level of qualification gained. The differences in employment 1 year later are entirely explained by, and attributable to, differences in employment during the training period. However, among trainees observed up to 3 years after they completed training, small positive employment effects of 2–4 percent were evident for many groups of trainees, suggesting there may be small longer-term employment impacts associated with gaining new qualifications through industry training.

Further results

Also considered were the extent to which the impact of training varied over the study period, the impacts on wage and salary earnings in the third year after the qualification was completed, and the impact of including income from self-employment in the outcome measure.

Impacts varied over the study period

About 30 percent of trainees in the study population (that is, all those who started and completed an episode of training during 2003–2008) started and completed their training in 2003–2005, and about 40 percent started and

completed their training in 2006–2008. These subsamples are skewed towards those undertaking shorter episodes of training.

The results for women who gained a qualification at level 1, 3, or 4 were more positive for training spells completed during 2006–2008 than for spells completed during 2003–2005. The results for men who gained a qualification at any level were similar for training spells completed during 2006–2008 and 2003–2005.

Impacts in the first and third year after training were similar

The impact of training on earnings may change over time. This can be examined to some extent by considering those who began and completed an episode of training between January 2003 and December 2005, and comparing estimated impacts 1 year and 3 years after completing training.[3]

For those who gained a qualification at any of levels 1–4, the impacts of training on earnings were similar, or declined slightly, in the third year after training compared with in the first year afterwards. The impacts declined slightly for women who gained a level 2 or 3 qualification and were no longer statistically significant. The impacts decreased slightly for men who gained a level 2 or 4 qualification, and increased slightly for men who gained a level 3 qualification.

Relatively few trainees completed training spells and gained a qualification at level 5 or above during 2003–2005, but the results indicate that the impacts of training for these trainees may have been greater in the third year after completing training than in the first year.

Including income from self-employment in the measure of earnings growth led to slightly greater impacts 3 years after completing training for women who completed a qualification at level 2 or above, and for men who gained a qualification at level 2 or 3. However, it made little difference for men and women who gained a qualification at level 1, or for men who gained a qualification at level 4 or above.

Comparison with results from the previous study of returns to industry training

The results from this study are more positive than those from the earlier study on the earnings benefits of gaining qualifications through industry training during 2002–2005 (Crichton, 2009).

The previous study found no significant earnings benefits for women aged 20–64 who gained a level 2 or 3 qualification, whereas this study (which includes all training spells during 2003–2008) found earning benefits of 4.5 percent and 6 percent. The previous study found only small earnings benefits for women who gained a level 4 qualification of about 2 percent, whereas this study found much larger earning benefits of 6.5 percent.

[3] Earnings growth over the 12-month pre-training to 12-month post-training period is compared with earnings growth over the 12 month pre-training to 25- to 36-month post-training period. Those who gained qualifications at level 2 or higher trained for 12–24 months on average, hence the year before and after training corresponds to a 24- to 36-month period, while the third year after training corresponds to a 48- to 60-month period on average.

Results for men were more similar, although the previous study found no significant earnings benefits for men who gained a level 2 qualification and this study found small but significant earnings benefits of 2 percent. The previous study found only small earnings benefits for men who gained a level 3 qualification of about 2 percent, whereas this study found larger earning benefits of 4.5 percent.

The differences in the results partly reflect changes in methodology, the main change being that this study focuses on the impacts of training 1 year rather than approximately 3 years after completing training.[4] The study population is also considerably larger, and as a result estimates are more precise and small impacts are much more likely to be statistically significant.

The difference in results mainly reflects that qualifications at levels 3 and 4 gained by women in 2006–2008 had larger positive impacts 1 year post-training, on average, than those gained in 2003–2005. It is unknown whether these impacts will decrease over time. (These impacts did decrease for women who gained a level 2 or 3 qualification in 2003–2005, but not for women who gained a level 4 qualification.)

Comparison with results on the returns to qualifications gained through tertiary institutions

Some results from this study can be directly compared to results from a study on returns to qualifications gained through tertiary institutions (Crichton and Dixon, 2010).

The 2010 study examined returns 3 years after completing study for those aged 25–64 who gained level 1–6 qualifications. The current study examined the returns to level 1–6 qualifications gained through industry training. Table S.3 compares the results from the two studies for those aged 25–64, over the same period.

Those who gained level 1–4 qualifications through tertiary institutions experienced no significant earning benefits. In comparison, men and women who gained level 2–4 qualifications through industry training experienced earning benefits of 2.7–5.5 percent, while those who gained a level 1 qualification experienced no earning benefits on average.

Women who gained level 5–6 qualifications through tertiary institutions experienced earnings benefits of 7 percent, while men experienced an earnings penalty. In comparison, women and men who gained level 5–6 qualifications through industry training experienced earning benefits of 17 percent and 10 percent, respectively.[5]

[4] This change was made so that returns to qualifications gained up to the end of 2008 could be examined. The current study examines impacts in both the first and third year post-training, while the previous study focused on impacts 4 years after training *started.* The training period for those who gained level 2 or 3 qualifications was about 12–18 months, so impacts 4 years after training started to correspond approximately to those during the third year post-training.

[5] Only about 220 industry trainees gained qualifications at level 5 or above over this period and impacts are imprecisely estimated.

Table S3: Estimated percentage impact on trainees' earnings growth by the third year after completion, by highest qualification gained through industry training or tertiary institutions during 2003–2005

	Industry training			Tertiary institution		
Highest qualification	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
Level 1	-2.3	-0.5	-3.6	-	-	-
Level 2	**3.3**	**2.8**	**3.9**	-	-	-
Level 3	**3.2**	**3.7**	**2.7**	-	-	-
Levels 1–3	**2.4**	**2.9**	1.9	**-2.0**	**-4.2**	-0.5
Level 4	**3.9**	**3.2**	**5.5**	-0.9	**-1.8**	-0.3
Levels 5–6	**12.9**	**9.7**	**17.0**	1.9	**-5.9**	**6.8**

Notes: Estimates in bold are statistically significant at the 5 percent level. Qualifications gained at levels 1–3 through tertiary institutions cannot be separately identified (-).

The findings suggest qualifications gained by 25–64-year-olds through industry training were associated with more widespread earnings benefits than qualifications gained through tertiary institutions over the same period.

Conclusions

This study examined the labour market benefits obtained by working adults aged 20–64 who participated in industry training during 2003 to 2008. On average, most groups of trainees who gained qualifications experienced earnings benefits as a result.

Those who gained a qualification at level 2 or above increased their earnings growth relative to the comparison group over the 1-year pre-training to post-training period. Gains generally increased as the level of the qualification increased. On average, level 2 qualifications were associated with a 3 percent increase in earnings growth over the period, level 3 with a 5 percent increase, level 4 with a 7 percent increase, and level 5 and above with a 5 percent increase in earnings growth on average.

Within a qualification level, the earnings benefits varied to some extent by age and sex, although gaining industry training qualifications were associated with earnings benefits for both women and men on average. Women benefited more from qualifications at levels 2 and 5 and above. In some cases, younger age groups benefited more than older age groups; this was particularly the case for those who completed level 4 qualifications.

Trainees who had finished training by the end of 2005 were observed up to 3 years afterwards, and for this group of trainees, the impact of training on earnings growth was similar for most groups of trainees by the third year after completing training compared with the first year.

Those who gained qualifications at most levels experienced small employment benefits 3 years after completing training.

The results from this study are more positive than those from the earlier study on the returns to qualifications gained through industry training during 2002–2005 (Crichton, 2009). The difference in the results is due to several factors: improvements to the methodology, the focus on impacts 1 year rather than 3 years after completing training, and that level 3 and 4 qualifications gained by

women in 2006–2008 had larger positive impacts 1-year post-training than those gained in 2003–2005.

Research on the returns to level 1–6 qualifications gained through tertiary institutions (Crichton and Dixon, 2010) found that only women who gained level 5–6 qualifications experienced earnings benefits 3 years later. Men who gained qualifications at levels 1–6 and women who gained qualifications at levels 1–4 experienced no earning benefits 3 years later.

These findings suggest qualifications gained by 25–64-year-olds through industry training were associated with more widespread earnings benefits than qualifications gained through tertiary institutions over the same period.

1 INTRODUCTION

This paper investigates the earnings benefits that are gained by adults aged 20–64 who participate in industry training. Industry training is formalised learning that occurs within the workplace. It provides employees with training and learning that is linked to nationally recognised qualifications through the New Zealand Qualifications Framework. Industry training is funded by both industry and government, with industry contributing about 30 percent of the total funding.[6]

A growing number of adults have been gaining new or additional qualifications through industry training. In 2008, for example, two-thirds of qualifications at levels 1–4 gained by men and one-fifth gained by women were gained through industry training rather than through tertiary education institutions. In 2008, 188,700 trainees participated in industry training, and 29,600 gained a qualification in that year.

Further training provides opportunities for adults to develop, broaden, and 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 trainee'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.

While we focus on the labour market outcomes of employees who participate in industry training, we acknowledge that industry training may have other impacts, for example improved productivity, health and safety, and other workplace practices.

Although there is little evidence on the motives of older trainees in New Zealand, it seems likely that many trainees who undertake further training are motivated by the goal of improving their future employment opportunities. This is certainly the case in countries such as Britain, where more extensive evidence on the motives of mature trainees is available.

While further education can have various benefits for individuals, this study focuses on whether trainees 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 training. These two types of administrative data (Ministry of Education enrolment and completion statistics and the Linked Employer–Employee Database data) have recently been linked together through the Employment Outcomes of Tertiary Education (EOTE) project.

Before the EOTE project was created, relatively little research had been done on the benefits associated with further education and training for working adults in

[6] Appendix A contains background information on industry training.

New Zealand. There have now been several studies that have used EOTE data to examine this topic, including one that examined the labour market returns to industry training (Crichton, 2009).

This study updates and extends the earlier study. Changes in the methodology were made so that some results from the current study (impacts 3 years post-training for those who gained qualifications during 2003–2005) would be directly comparable to the study on returns to qualifications gained during 2003–2005 through tertiary institutions (Crichton and Dixon, 2010).

The main results are based on impacts of training 1 year post-training rather than approximately 3 years. This means that returns to qualifications gained up to the end of 2008 can be examined, and that impacts 1 year and 3 years post-training for those who completed training by the end of 2005 can be compared. The impact of including income from self-employment as well as wages and salaries in the outcome measure is also considered.

Extending the study period from 2005 to 2008 also mean that the study population is considerably larger, and as a result estimates are more precise and small impacts are much more likely to be statistically significant

This study uses a difference-in-difference approach and compares the employment and earning changes experienced by the trainees over the pre-training to post-training period, with the changes experienced by a matched comparison group of working adults who did not participate in industry training over the same period. A regression framework is used to estimate the impact of training on workers' future earnings growth, and to examine whether the impact of gaining a qualification varies by the level of the qualification, age, sex, field of study, and the industry training organisation (ITO) overseeing the training. Confidentiality requirements mean that results for individual ITOs cannot be reported, so we only describe the degree of variation observed.

This study focuses on people aged 20–64 who participated in industry training during 2003–2008, did not undertake any further training in the following year, and were employed in a wage or salaried job in the year both before and after their training spell (for at least 6 months).

We focused on working adults who completed qualifications during 2003–2008, allowing us to observe the employment and earnings of each trainee for at least 3 years before training started and at least 1 year after completion.[7] For those who completed training in 2008 we observed outcomes only 1 year after training, but for those who had completed training by the end of 2005, we observed wage and salary outcomes up to 4 years afterwards, and self-employment income up to 3 years afterwards.

We estimated the impact of gaining a qualification on earnings by comparing the earnings growth experienced by the trainees in our study population with the earnings growth experienced by a comparison group of matched non-trainees, over the pre-training to post-training period. This paper focuses mainly on the

[7] While a significant number of trainees completed qualifications within the study period of 2003–2008, some took longer than 6 years, and those who completed within 6 years may not be representative of the wider group.

impact of further education on earnings rather than employment rates because earnings are measured more accurately than employment rates in EOTE.

The paper makes three contributions to the New Zealand literature on the labour market benefits of further tertiary education and training.

First, it is one of the first New Zealand studies to use longitudinal data, with observations on trainees' employment and earnings before and after the training period. 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 trainees in our study population with comparison non-trainees using information on their demographic characteristics and employment and earnings profiles during the 3 years before their 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 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 training.

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 main and supplementary analyses. Section 4 concludes.

The results presented in this paper indicate that most qualifications at level 2 and above that were completed by 20–64-year-olds led to improvements in their subsequent earnings growth. On average, qualifications at levels 2–5 were associated with earnings benefits for men and women, in all age groups, on average, although in most cases younger age groups benefited more than older ones. Women benefited more from qualifications at levels 2 and 3, while men and women benefited similarly from qualifications at level 4.

By disaggregating within level by field of study, we found that the impacts were quite variable, with trainees in some fields experiencing significant benefits and trainees in other fields experiencing no or only small earnings benefits.

2 PREVIOUS RESEARCH

Before the Employment Outcomes of Tertiary Education (EOTE) project, relatively little research had been done on the benefits associated with further education and training for adults in New Zealand. Several studies have used the EOTE data set to examine this topic, including Crichton (2009), Scott (2009), and Crichton and Dixon (2010).

Scott (2009) compared the annual earnings of different groups of young graduates who enrolled in tertiary education institutions and completed a qualification. Crichton (2009) and Crichton and Dixon (2010) estimated the returns to gaining further qualifications (below degree level) for working adults.

Crichton (2009) examined the impact of gaining qualifications through workplace-based industry training on trainees' earnings and employment rates. Focusing on trainees aged 15–64 who completed qualifications at levels 1–4 through industry training during 2002–2005, 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. Considering only trainees aged 25–64, males who completed level 3 or 4 certificates and females who completed level 4 certificates experienced earning benefits of 1–4 percent approximately 2 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. Results for those aged 15–19 are also included, but the study design did not provide reliable estimates for this age group.[8]

This current study updates and extends the earlier study by including a longer study period and income from self-employment as well as wages and salaries in the outcome measures. This study adopts a regression framework to estimate the impact of training on workers' future earnings growth, and examine whether the impact of gaining a qualification varies by the level of the qualification, age, sex, field of study, and the industry training organisation (ITO) overseeing the training.

Crichton and Dixon (2010) examined the returns to gaining qualifications through tertiary institutions for working adults. The study design was similar to this current study, but the focus was on students who completed an episode of study and gained a qualification at a tertiary education institution during 2003–2005. The main finding was that only a small proportion of the students in this study population had improved their earnings (compared with the earnings of a matched comparison group of working adults who did not return to study) by 3 years after completion.

8 Many trainees in this age group would have been working in part-time jobs while at school or enrolled in a tertiary institution, so their pre-training monthly earnings do not provide a reliable indication of their earnings potential before they starting training.

Students who completed a certificate (at levels 1–3 or 4) 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 (levels 5 and 6) 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. The authors identified several factors that might have contributed to this result, including that 60 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.

The EOTE data set has some significant limitations. In particular, it lacks information on individuals' prior educational attainment and it provides only one measure of earnings (total monthly earnings). Crichton and Dixon (2010) use the Survey of Family, Income and Employment to explore the impact of these limitations. They concluded that changes in monthly earnings could be totally driven by changes in hours worked, so it does not always give a useful indication of the underlying change in wages. (For example, they found that although women who gained level 4–6 qualifications experienced earnings benefits, they did not gain any wage benefits.) They also concluded that the omission of prior education from the case-matching probably did not lead to any substantial underestimation of the average benefits of further study. (Interestingly, they found that only 40 percent of those who gained a qualification raised their level of educational attainment as a result of gaining the new qualification.)

Scott (2009) used EOTE data to compare the annual earnings of young graduates who enrolled in tertiary education institutions directly after school and completed a qualification in 2003. The outcome measures were annual earnings 1 year after the completion of the qualification and 3 years after completion. The impact of tertiary qualifications at level 4 and above was assessed by comparing the earnings of trainees who completed these higher qualifications with the earnings of trainees who gained level 1–3 certificates only in a regression framework with controls for the effects of particular characteristics such as age, sex, and industry of employment. (Prior educational attainment is not available in EOTE, and this seems a significant limitation of the analysis.) The results showed 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.[9] Examining the incomes of graduates by the main subject area of their qualification, Scott also found large variations by field of study, which presumably reflected differences in the salaries of the jobs entered after graduation.

[9] 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.

Crichton and Dixon (2010, pp 3–7) summarised the literature from New Zealand and overseas on the labour market returns to further education and training:

> 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 (level 1-6) is similar to the value of an upper school qualification.
>
> (…) These early New Zealand studies estimated the impact of education on earnings after taking certain individual characteristics into account, such as age and sex, but none included a wide range of control variables. Nor do these studies, with the exception of Crichton (2009) and Crichton & Dixon (2010), 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 males and females. 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. 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 sex 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 sex and qualification-level groups but not others.

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 trainee, 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 ANALYSIS AND RESULTS

3.1 Introduction

This section presents the methods used and results obtained in our 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 qualification through industry training since 2003 linked to information on their labour market outcomes.[10] Because of its comprehensive coverage, EOTE supports research into the labour market outcomes associated with different types of qualification, industry of employment, and demographic groups.

The EOTE data set is 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 include details of all participation in industry training between 2002 and 2009, including modern apprenticeships.[11]

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. LEED also holds information on other forms of income such as income from income support benefits, accident compensation payments, paid parental leave, and trainee allowances. The age, sex, 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 Longitudinal Business Frame. The data on firms include ownership relationships, industry, geographical location, and size.

[10] The data before 2003 did not include information on qualifications gained or the numbers of credits achieved.

[11] This study focused on those aged 20–64 when they started training, and included very few modern apprentices who are typically aged 16–21 when they start training.

LEED and the EOTE data set 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-trainees. No information on marital status or family relationships is available in LEED or EOTE.

Within the industry training data, the level of training is classified in accordance with the national qualifications framework (NQF). Training programmes (and qualification gained) within industry training are usually between levels 1 and 5.

A level 1–3 qualification is equivalent to study at upper secondary school level. The majority of certificates at levels 1–2 can be completed within 12 months, and the majority of level 3 qualifications can be completed within 1–2 years. A level 4 qualification requires skills at a higher level and may require 2, 3, or perhaps 4 years to complete. Qualifications at levels 5–6 also require 1–3 years to complete, but involve a higher level of skill than those at level 4. A very small number of qualifications are at level 7 (equivalent to bachelor's degree level) or above. In the analysis in this paper, qualifications at level 5 and above have been grouped together.

Our analyses focus on the highest qualification gained by the trainee during the training period, not on the completion status associated with a particular programme. Appendix A includes more information about the source data sets.

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 and the approach used to define and select a suitable comparison group of non-trainees.

In brief, the study population was selected to ensure that all members were employed for a minimum period before and after the reference training spell (so we could construct an earnings growth measure). The training spell included breaks in employment or training of up to 12 months. (As a consequence of this, trainees did not train during the 12 months before or after the reference spell.) The comparison group was constructed by individually case-matching each trainee with a similar non-trainee (and where possible up to five non-trainees), using information on age, sex, region, pre-training employment history, and pre-training earnings. 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 trainees who were successfully matched with LEED, and participated in industry training while working. It comprises those who began training after 1 January 2003 and had finished by 31 December 2008. We selected those who were employed for at least 6 months during the 3 years before they enrolled in industry training and for at least 6 months during

the year after they completed their qualification. We refer to the training that was undertaken between 2003 and 2008 as the reference training spell.

In detail, the main study population comprises people who:

- could be matched to a record in LEED
- participated in industry training while in wage and salary employment during 2003–2008, after a gap of at least 1 year since their last spell of industry training
- were aged 20–64 at the time they began their reference training spell
- ceased training by 31 December 2008 and had a gap of at least 1 year before starting another spell of training
- worked in a waged or salaried job for at least 6 months during the 12 months before the start of their reference training spell
- worked in a waged or salaried job for at least 6 months during the year after the end of the reference training spell; this is our 1-year follow-up period.

For those who completed their training spell before the end of 2005, we considered outcomes during the third year post-training (that is, if they worked in a waged or salaried job for at least 6 months during the third year after the end of the reference training spell (that is, during months 25–36); this is our 3-year follow-up period.

Ninety-four percent of all trainees were matched to a record or records in LEED, the source of the employment and earnings data. The other 6 percent were dropped from the analysis.

We focused on trainees who began an episode of training after 1 January 2003 and had finished by 31 December 2008 because this ensures we have detailed information on their employment history and earnings in the 3 years before they began training and for at least 1 year afterwards. Similarly, we focus on people who were aged at least 20 when they started training to ensure they were old enough to have had at least 1 year of full-time work experience before selection into our study population. We relied on information about pre-training 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 train from 2003 onwards.[12]

We identified the months in which an individual was training, and permitted breaks of up to 12 months within the reference training spell.[13] Many trainees gained more than one qualification during the reference training spell. This was the case for 25 percent of those whose highest qualification gained was at level 3, 38 percent of those whose highest qualification gained was at level 4, and nearly 50 percent of those whose highest qualification was at level 5 or above. In most cases, trainees had gained certificates at lower levels, for example those who had gained a level 4 qualification had gained a level 3 qualification as well. We focused on the highest qualification obtained over the

[12] About 15 percent of training spells were associated with individuals aged under 20 when they started training.

[13] If a trainee undertook multiple spells of training during 2003–2008 that were separated by more than 12 months, we included all spells. Approximately 3 percent of trainees had more than one spell over the study period January 2003 – December 2008.

period and identified the industry training organisation (ITO) that administered the programme.[14] The study design means that for some trainees we estimated the labour market impacts of two or more qualifications.

Impact of the selection criteria

Our selection criteria required the training spell to have begun and ended within a specific 6-year period (that is, 2003–2008). As a result of these criteria, our study population is somewhat biased towards trainees who completed a qualification within a short period, and excludes those who trained for a long period.

About 95 percent of the trainees aged 20–64 who began a new training spell during 2003 had completed it by the end of 2008. Trainees who enrolled for a lower-level qualification were much more likely to complete it within a 3-year time horizon than those who enrolled for higher level qualifications.

To test whether having a population that is biased towards those who completed a qualification within a short time is likely to influence the results, we compared those results for those who started and completed training during 2003–2005 (and 2006–2008) with those in the total study population. Our results suggest that this has not affected the overall findings.

Table 1 provides information on the impact of the various selection criteria on the numbers of trainees in the final study population. The first row of the table shows the total number of trainees with a training spell that began and ended between 1 January 2003 and 31 December 2008 (143,470).

Significant numbers of trainees were excluded because they did not meet the pre-training and post-training employment criteria (working in a waged or salaried job for at least 6 months). Our main study population includes about 70 percent of all trainees who completed qualification during the period under consideration. It includes 70 percent of those who completed level 1–3 qualifications, 66 percent of those who completed level 4 qualifications, and 80 percent of those who completed level 5 and above qualifications. About half of the overall loss of sample members was due to the employment criteria and about half was due to the lack of a suitable match.

Table 13, in Appendix A, provides information on the impact of the various selection criteria on the numbers of trainees in the broader study population used to assess the impact of training on subsequent employment status. This broader study population includes about 80 percent of all trainees who completed qualification during the period under consideration.

[14] If more than one qualification was gained at the same level of the NQF, we selected the one with the highest number of credits.

3.3.2 Selecting the matched comparison group

To calculate the effect of further education on trainees' subsequent labour market outcomes it was necessary to construct an estimate of what the trainees' employment or earnings would have been if they had not studied. Our overall approach was to match the study population to a random sample of employees who had similar observed characteristics and employment histories, but did not enrol in any industry training between 2002 and 2009. Where possible, each study population individual was matched with up to five individuals of the same age, sex, and region, with a matching profile for wage and salary employment and earnings in the year before the training spell began. The outcomes of the matched sample of non-trainees (the comparison group) were then compared with the outcomes of the matched trainees, using a regression framework. Regression models allow us to make further adjustments for differences between the study population and comparison group that were not eliminated at the case-matching stage (such as differences in benefit receipt or self-employment.)

To be selected for the comparison group sample, the non-trainees were required to have the same age and sex and the same or similar number of months employed in waged or salaried jobs in the 12 months before the training spell. In addition, the comparison group members were required to have average monthly earnings in the 12 months before the training spell that were within 10 percent of those of the trainee to which they are matched.

All matching was done with replacement, so a non-trainee could be matched to more than one trainee. If more than one potential match was identified, we randomly selected up to five matches for each trainee.

Eighty-eight percent of individuals in the study population had at least one match to a comparable non-trainee, so were included in the final sample used in the analysis. The matched and non-matched study population members are compared in Table 2. Trainees 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-trainee, as were trainees with lower pre-training earnings. The matched trainees and the comparison group are compared in section 3.4.2.

Table 1: Selection of the main study population

Step	Selection criteria	Total	Highest qualification gained							
			None	Limited credit programme	Level 1	Level 2	Level 3	Level 4	Level 5+	Level 1–5
1	All training spells of trainees aged 20–64 that began and ended between January 2003 and December 2008	143,470	82,760	11,560	5,370	14,430	14,290	13,470	1,590	49,150
2	In waged employment for at least 6 of the 12 months before the start of training spell	119,220	66,050	9,990	5,070	12,520	12,530	11,600	1,470	43,190
3	In waged employment for at least 6 of the 12 months in the follow-up period, 1–12 months after study ended	94,480	47,170	8,960	4,500	11,100	11,370	10,040	1,350	38,350
4	Case-matched to at least one comparable non-trainee	84,970	41,990	8,020	4,010	10,290	10,240	9,160	1,260	34,960
5	Case-matched to at least one comparable non-trainee who met the employment criteria	83,030	40,910	7,910	3,930	10,100	10,010	8,930	1,250	34,220
	Percentage retained between steps 1 and 2 (%)	83.1	79.8	86.4	94.4	86.8	87.7	86.1	92.5	87.9
	Percentage retained between steps 2 and 3 (%)	79.2	71.4	89.7	88.8	88.7	90.7	86.6	91.8	88.8
	Percentage retained between steps 3 and 4 (%)	89.9	89.0	89.5	89.1	92.7	90.1	91.2	93.3	91.2
	Percentage retained between steps 4 and 5 (%)	97.7	97.4	98.6	98.0	98.2	97.8	97.5	99.2	97.9
	Percentage retained between steps 3 and 5 (%): match rate	87.9	86.7	88.3	87.3	91.0	88.0	88.9	92.6	89.2
	Final sample as a percentage of all trainees (%)	57.9	49.4	68.4	73.2	70.0	70.0	66.3	78.6	69.6

Table 2: Pre-study characteristics of those who were matched and unmatched within the study population

Characteristics	Total				Gained a qualification			
	Match rate (%)	Matched		Total	Match rate (%)	Matched		Total
		Yes	No			Yes	No	
Total	87.9	83,030	11,450	94,480	89.2	34,220	4,130	38,350
Sex and age								
Female	88.4	38.2	36.3	37.9	89.1	39.3	39.8	39.3
Male	87.5	61.8	63.8	62.1	89.3	60.7	60.3	60.7
Female aged 20–24	87.6	6.6	6.8	6.6	88.7	6.5	6.8	6.5
Female aged 25–34	86.8	9.5	10.3	9.6	88.3	10.0	11.0	10.1
Female aged 24–44	88.4	10.4	9.9	10.3	88.7	11.0	11.6	11.0
Female aged 45–64	90.1	11.7	9.3	11.4	90.5	11.9	10.4	11.7
Male aged 20–24	85.8	12.1	14.5	12.4	86.5	11.2	14.5	11.6
Male aged 25–34	86.9	18.7	20.3	18.8	88.7	18.3	19.3	18.4
Male aged 24–44	89.6	16.3	13.7	16.0	91.9	16.2	11.9	15.7
Male aged 45–64	87.4	14.8	15.3	14.8	89.5	15.0	14.6	15.0
Labour market history 12 months before training								
Employed 6–7 months	52.3	2.7	17.5	4.5	45.8	2.4	16.6	3.9
Employed 8–9 months	65.4	4.4	16.8	5.9	31.5	4.2	16.0	5.5
Employed 10–11 months	86.7	12.1	13.4	12.2	11.1	11.5	11.8	11.5
Employed 12 months	91.8	80.9	52.3	77.4	7.6	82.0	55.5	79.1
Average monthly earnings less than $1,000	67.6	3.3	11.4	4.3	70.9	3.1	10.7	4.0
Average monthly earnings $1,000–1,999	80.1	13.0	23.5	14.3	80.2	11.0	22.6	12.3
Average monthly earnings $2,000–2,999	88.5	25.6	24.1	25.4	89.5	23.0	22.3	22.9
Average monthly earnings $3,000–3,999	91.8	27.0	17.4	25.8	92.2	28.6	20.0	27.7
Average monthly earnings $4,000–4,999	92.6	16.2	9.4	15.4	93.7	18.0	10.1	17.2
Average monthly earnings $5,000–6,999	90.4	12.1	9.3	11.7	91.7	13.6	10.1	13.2
Average monthly earnings $7,000+	80.1	2.8	5.1	3.1	83.5	2.6	4.3	2.8
Industry								
Agriculture, Forestry and Fishing	81.1	7.1	11.9	7.7	81.4	4.5	8.6	5.0
Mining	59.6	0.3	1.6	0.5	65.2	0.1	0.6	0.2
Manufacturing	85.5	21.5	26.3	22.1	88.8	25.3	26.6	25.4
Electricity, Gas, Water and Waste Services	64.9	0.7	2.6	0.9	63.5	0.5	2.3	0.7
Construction	90.4	9.6	7.4	9.3	90.7	8.6	7.4	8.5

Characteristics	Total				Gained a qualification			
	Match rate (%)	Matched		Total	Match rate (%)	Matched		Total
		Yes	No			Yes	No	
Wholesale Trade	84.6	3.8	4.9	3.9	84.7	3.1	4.7	3.3
Retail Trade	93.0	10.3	5.6	9.7	93.9	12.0	6.5	11.4
Accommodation and Food Services	93.6	6.4	3.1	6.0	91.9	5.4	3.9	5.2
Transport, Postal and Warehousing	84.8	5.3	6.8	5.5	90.7	4.8	4.1	4.7
Information Media and Telecommunications	81.0	0.9	1.5	0.9	83.3	1.0	1.7	1.1
Financial and Insurance Services	90.4	1.0	0.8	1.0	90.7	1.4	1.2	1.3
Rental, Hiring and Real Estate Services	80.9	0.6	1.0	0.6	80.6	0.4	0.7	0.4
Professional, Scientific and Technical Services	92.5	3.4	2.0	3.2	92.6	3.4	2.2	3.2
Administrative and Support Services	89.5	5.1	4.3	5.0	88.5	5.1	5.5	5.1
Public Administration and Safety	91.6	7.4	4.9	7.1	91.9	10.7	7.8	10.4
Education and Training	88.0	1.4	1.4	1.4	84.6	1.1	1.7	1.2
Health Care and Social Assistance	95.1	10.9	4.0	10.0	93.2	8.4	5.0	8.0
Arts and Recreation Services	69.4	2.3	7.5	3.0	66.4	1.6	6.6	2.1
Other Services	87.1	2.2	2.4	2.3	88.2	2.6	2.9	2.7
Establishment size (number of employees)								
1–5	88.8	9.9	9.1	9.8	90.2	8.7	7.8	8.6
6–9	82.9	6.7	10.0	7.1	86.1	6.5	8.7	6.8
10–19	85.4	11.9	14.6	12.2	87.7	11.6	13.5	11.8
20–49	88.8	20.6	18.7	20.3	89.8	19.4	18.2	19.2
50–99	87.3	15.5	16.3	15.6	86.6	13.0	16.6	13.4
100–249	89.7	17.5	14.5	17.2	90.4	17.9	15.7	17.6
250–499	87.0	9.2	9.9	9.3	88.4	11.0	11.9	11.1
500–999	91.0	6.1	4.4	5.9	93.6	8.4	4.7	8.0
1,000+	92.3	2.6	1.5	2.4	93.2	3.6	2.2	3.4
Average age (years)	…	36.5	35.8	36.5	…	36.7	35.8	36.7
Male	…	62.1	63.8	62.1	…	60.7	60.2	60.7
Number of months employed in the 12 months before training started	…	11.4	10.3	11.4	…	11.4	10.4	11.4
Average monthly earnings in the 12 months before training started ($)	…	3,410	3,050	3,410	…	3,570	3,070	3,510

3.4 Sample characteristics

3.4.1 Characteristics of the study population

Table 3 presents summary information on the demographic characteristics of the study population members. We focus on the trainees who were matched to comparison group (that is, the sample used in the main analysis of earnings).

Approximately 60 percent of the trainees in the main study population were men, reflecting the sex mix of participants in industry training. About 70 percent of the trainees who successfully completed a qualification at level 4 or above were men, while 55 percent of those who completed a qualification at level 1 were men. Overall, about 20 percent of trainees were aged 20–24, 30 percent were aged 25–34, one-quarter aged 35–44, and the remaining one-quarter aged 45–64.

The median duration of training was 9 months among those who gained a level 1 or 2 qualification, 15 months for a level 3 qualification, 21 months for a level 4, and 18 months for level 5 and above. Within qualification level, training duration was very variable.[15] For example, among those who gained a level 4 qualification, nearly 30 percent trained for 12 months or less, while 20 percent trained for 3 months or more. Among those who gained a level 2 qualification one-quarter trained for more than 2 years. The administrative data contains information on intended duration of the training programmes. At level 1 this is typically up to 1 year, at levels 2 and 3 its 1–2 years, and at level 4 and above its 1–4 years.

The median number of credits achieved by trainees who gained a level 1 or 2 qualification was about 50, level 3 about 70, level 4 about 130, and level 5 or above about 145.

The age and sex distribution, average pre-training earnings, employment history, and benefit receipt of trainees were cross-tabulated by level of qualification. Those who gained different qualification levels had different industry profiles. This reflects that many ITOs only offer (or focus on) qualifications at a particular level or levels. Information on the profile of the trainees at each qualification level is helpful for interpreting the results presented later in this paper. The Ministry of Education regularly publish information on the number and profile of trainees.

[15] Some trainees may have been finishing qualifications that they had begun in a previous training spell.

Table 3: Characteristics of the main study population by highest qualification gained

	Highest qualification gained							
	No qualification		Level of qualification					
Characteristic	**Did not complete LCP**	**Completed LCP**	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5+**	**Total**
Number of observations	40,920	7,910	3,930	10,100	10,010	8,930	1,250	83,030
Sex and age								
Male aged 20–24	7.0	5.6	2.4	9.5	7.5	4.8	1.2	6.7
Male aged 25–34	9.0	9.8	7.5	10.3	12.4	8.3	7.0	9.5
Male aged 35–44	9.2	14.9	14.6	11.9	10.5	8.5	9.9	10.4
Male aged 45–64	9.0	25.4	21.3	13.6	11.5	6.3	10.1	11.7
Female aged 20–24	14.3	5.8	8.0	11.2	8.3	18.0	1.4	12.3
Female aged 25–34	20.3	10.9	15.4	16.2	17.9	23.8	11.9	18.7
Female aged 35–44	17.2	11.2	15.3	13.4	16.9	17.1	25.1	16.2
Female aged 45–64	14.0	16.5	15.6	13.9	14.9	13.2	33.4	14.6
Female	33.9	55.8	45.6	44.9	41.9	27.6	27.9	38.1
Mean age (at start of training spell) (years)	35.5	40.9	40.0	36.5	36.8	34.5	42.6	36.5
Highest previous qualification								
None	19.2	19.4	25.7	16.2	16.7	11.8	4.3	17.8
5th form (or 12 credits at NQF level 1)	14.2	12.1	18.8	17.7	15.1	15.0	6.2	14.7
6th form (or 12 credits at NQF level 2)	9.5	7.7	7.4	10.6	10.4	12.9	7.4	9.8
7th form (or 12 credits at NQF level 3)	5.0	4.1	3.2	6.3	6.2	6.5	3.1	5.0
National certificate, trade certificate, or diploma	16.0	17.7	11.9	15.3	19.3	20.8	20.1	16.0
Degree	6.7	7.5	1.3	5.6	7.4	5.6	10.4	6.7
Not specified	29.4	31.5	31.6	28.4	24.8	27.5	48.5	29.4
Ethnicity								
European/Pākehā	63.2	62.9	52.3	61.7	67.2	70.6	75.6	63.9
Māori	16.7	12.1	24.1	16.9	14.0	13.2	10.4	15.8
Pacific	6.0	7.7	10.5	6.8	6.0	3.5	2.7	6.2
Other	7.7	10.9	6.0	11.0	9.2	6.6	6.3	8.4
Not stated	6.4	6.4	7.0	3.6	3.7	6.2	5.0	5.7
Start year								
2003	21.1	17.3	7.7	14.5	22.5	23.7	25.4	19.8
2004	22.6	18.7	11.0	11.5	19.8	21.4	9.7	19.7
2005	24.2	18.8	32.3	17.7	20.4	25.7	22.5	23.0
2006	17.7	13.4	29.3	19.1	19.4	18.4	33.8	18.6
2007	10.9	16.7	17.1	27.4	12.7	8.3	6.8	13.6
2008	3.4	15.1	2.6	9.7	5.1	2.5	1.8	5.3
Exit year								
2003	4.0	6.3	1.7	3.9	2.7	2.6	6.1	3.9
2004	10.9	16.1	5.8	10.4	11.2	6.9	3.2	10.4
2005	16.8	16.5	15.4	15.4	15.4	12.9	11.9	15.4
2006	20.7	14.9	23.7	20.1	21.7	21.0	23.6	20.1
2007	22.8	20.2	30.1	24.3	24.9	30.0	34.5	24.3
2008	24.8	26.1	23.3	25.9	24.0	26.7	20.7	25.9

Characteristic	Highest qualification gained								
	No qualification		Level of qualification						
	Did not complete LCP	Completed LCP	Level 1	Level 2	Level 3	Level 4	Level 5+	Total	
Training period									
1–6 months	18.0	52.0	29.0	23.5	18.8	12.6	15.1	23.5	
7–12 months	18.7	20.0	35.7	21.0	22.1	14.5	13.2	21.0	
13–24 months	31.3	19.1	21.6	28.4	31.9	31.6	37.5	28.4	
25–36 months	21.3	6.1	8.0	16.9	16.6	19.5	23.1	16.9	
37–48 months	7.3	2.2	4.9	7.1	7.7	15.1	6.8	7.1	
49+ months	3.4	0.6	1.0	3.1	2.9	6.7	4.3	3.1	
Median training period (months)	17	6	9	8	15	21	18	14	
Mean training period (months)	19	10	13	12	18	24	20	18	
Total number of credits gained (all programmes)									
None	42.9	6.4	1.8	7.9	4.1	3.8	4.6	23.8	
1–19	21.6	10.1	2.7	2.3	2.2	2.6	1.9	12.6	
20–39	18.4	77.0	6.5	3.4	6.5	4.2	2.2	18.4	
40–59	8.1	3.9	57.6	53.0	17.5	9.2	6.5	16.7	
60–119	6.7	2.4	30.3	26.2	55.3	26.9	19.8	18.0	
120–239	2.1	0.2	0.9	6.9	13.7	33.7	31.1	7.7	
240+	0.3	0.0	0.2	0.4	0.7	19.6	34.0	2.9	
Median number of credits	5	25	53	53	69	130	144	30	
Mean number of credits	20	25	55	60	78	149	167	50	
Number of credits available (highest qualification gained)									
20–39	…	98.3	0.7	0.1	1.5	0.9	0.4	…	
40–59	…	1.7	98.6	80.8	23.1	12.7	10.2	…	
60–119	…	0.0	0.4	17.6	70.1	36.4	12.5	…	32.6
120–239	…	0.0	0.2	0.7	4.8	25.5	71.6	…	32.6
240+	…	0.0	0.0	0.7	0.5	24.6	5.4	…	32.6
Total number of certificates gained (all programmes)									
None	100.0	100.0	0.0	0.0	0.0	0.0	0.0	58.8	
1	…	…	95.5	82.1	75.4	62.0	48.0	31.0	
2	…	…	4.3	12.2	19.7	15.2	16.1	5.9	
3+	…	…	0.2	5.7	4.9	22.7	35.9	4.3	
Programme category (last programme)									
Limited credit	13.5	100.0	3.7	3.0	5.4	6.6	21.7	18.4	
National certificate	86.5	0.0	96.3	97.0	94.6	93.4	78.3	81.6	
Programme funding (last programme)									
Industry training	98.9	100.0	99.9	99.7	99.4	96.6	100.0	99.0	
Modern apprenticeship	1.1	0.0	0.1	0.3	0.6	3.4	0.0	1.0	
Programme level (last programme)									
1	7.9	1.8	75.4	1.2	0.5	0.3	0.1	7.9	
2	26.4	32.1	20.5	87.8	3.5	5.2	21.6	29.0	
3	40.0	58.5	2.9	7.5	92.5	3.6	1.3	37.9	
4	23.3	7.6	1.2	3.4	3.3	89.9	2.2	22.8	
5+	2.4	0.1	0.0	0.1	0.2	1.0	74.8	2.5	
Number of credits available (last programme)									
20–39	12.8	98.2	3.3	2.8	5.3	6.2	21.7	17.8	
40–59	30.5	1.7	75.8	77.6	22.5	13.9	11.4	32.6	
60–119	40.1	0.1	19.7	17.5	66.3	32.0	12.9	34.4	
120–239	10.0	0.0	1.0	1.3	5.3	24.0	48.4	9.1	
240+	6.6	0.0	0.2	0.8	0.6	23.8	5.5	6.1	
Expected programme duration (last programme)									
1–6 months	8.8	16.6	1.8	41.9	4.8	2.5	8.6	12.1	
7–12 months	40.5	83.4	74.1	35.6	43.5	23.0	26.0	43.9	
13–24 months	34.2	0.0	23.6	20.2	45.4	32.1	35.5	29.9	

Characteristic	Highest qualification gained							
	No qualification		Level of qualification					
	Did not complete LCP	Completed LCP	Level 1	Level 2	Level 3	Level 4	Level 5+	Total
25–36 months	9.6	0.0	0.3	1.3	5.5	16.2	28.4	7.7
37–48 months	6.8	0.0	0.2	0.9	0.9	26.3	1.5	6.5
Exit code (last programme)								
Missing	7.1	0.0	0.8	1.0	1.9	2.3	1.7	4.1
Completed	0.1	100.0	75.3	88.9	90.7	89.5	95.3	45.9
Terminated	92.9	0.0	23.9	10.1	7.4	8.2	3.0	49.9
Industry of employment (when started training)								
Agriculture, Forestry and Fishing	10.4	1.3	1.5	7.1	2.0	7.3	2.2	7.2
Mining	0.6	0.1	0.0	0.1	0.3	0.2	0.2	0.3
Manufacturing	18.5	17.6	60.3	30.2	16.1	15.2	5.7	21.0
Electricity, Gas, Water and Waste Services	0.9	0.3	0.0	0.1	0.7	0.8	1.3	0.7
Construction	11.3	4.7	3.1	4.4	9.2	16.5	4.2	9.7
Wholesale Trade	4.4	2.7	1.9	2.2	5.8	2.0	0.5	3.7
Retail Trade	10.0	5.3	1.1	28.2	6.8	4.7	4.4	10.3
Accommodation and Food Services	6.6	11.6	0.8	8.7	5.7	3.8	3.3	6.6
Transport, Postal and Warehousing	5.3	7.7	1.1	2.9	11.0	2.2	2.0	5.4
Information Media and Telecommunications	0.8	0.5	0.0	0.6	2.2	0.7	1.3	0.9
Financial and Insurance Services	0.8	0.2	0.3	0.2	3.9	0.4	0.5	1.0
Rental, Hiring and Real Estate Services	0.8	0.5	0.2	0.2	0.5	0.6	0.1	0.6
Professional, Scientific and Technical Services	3.5	2.6	6.1	2.3	4.0	2.0	6.6	3.3
Administrative and Support Services	4.9	5.4	3.1	2.5	7.3	6.6	1.8	5.0
Public Administration and Safety	5.7	3.3	0.2	0.8	8.1	24.2	54.1	7.6
Education and Training	1.8	1.2	0.6	0.5	1.6	1.3	2.6	1.5
Health Care and Social Assistance	8.6	31.6	19.4	7.7	10.0	2.8	7.1	10.7
Arts and Recreation Services	2.9	2.9	0.0	0.7	3.7	1.0	1.2	2.3
Other Services	2.3	0.7	0.1	0.7	1.3	7.8	1.2	2.3
Establishment size (when started training)								
1–5	12.1	4.1	1.6	7.7	6.5	17.0	5.6	10.1
6–9	7.4	3.4	1.5	6.8	6.2	9.5	4.2	6.7
10–19	12.5	9.4	2.5	11.0	12.6	14.7	16.4	11.9
20–49	20.8	24.7	7.9	16.0	21.4	23.7	35.3	20.6
50–99	16.0	24.5	9.8	12.0	16.0	12.2	14.2	15.6
100–249	17.1	19.6	25.6	20.3	18.4	11.7	10.8	17.6
250–499	8.1	7.3	19.2	12.0	11.8	5.5	6.3	9.1
500–999	4.3	5.1	23.3	10.7	4.6	3.6	3.8	6.0
1,000+	1.7	1.9	8.7	3.5	2.8	2.1	3.4	2.5

Note: LCP = limited credit programme; NQF = national qualifications framework.

3.4.2 Labour market histories of study population and matched comparison group

Next, we provide detailed descriptive information (by qualification level and sex) on the pre-training and post-training labour market and benefit receipt histories of the study population and comparison group.

Table 4 reveals that the women had somewhat less continuous employment patterns than men had before they started training, but these differences in employment continuity are not particularly large. Overall, trainees had worked for an average of 11–12 months of the year before they started training, and for 32–34 months of the 3 years before they started training. Around 85 percent had been employed in every month of the year before and around half had been employed in every month of the 3 years before they started training. Those who gained qualification at higher levels were more likely to have been continuously employed before they started training.

The average monthly earnings of the female trainees in each qualification group were substantially lower than those of male trainees, both before and after training. Those large sex differences are likely to be due to the lower weekly hours worked by women as well as their lower average hourly earnings. Not surprisingly, there is a strong positive correlation between the level of the qualification gained and the average monthly earnings (before training) of the trainees who enrolled for it. Those trainees who gained a qualification at level 5 or above earned considerably more before enrolment than trainees who gained a qualification at a lower level. Average monthly earnings in the pre-training year ranged from $2,540 for women who gained a qualification at level 1 to $6,425 for men who gained a qualification at level 5 or above.

Female trainees were more likely than male trainees to have received benefit income during the pre-training period. Between one-fifth to one-third of the women, and one-quarter to less than one-twentieth of the men had received some benefit income during the 3 years before their enrolment. If they received some benefit income, the average number of months of benefit income was about 14 months for women and 8 months for men who gained a level 1–3 qualification. Between 1 in 10 and 2 in 10 trainees had received some income from self-employment during the 3 years before the start of the training spell.

The match criteria ensured a high level of similarity between the matched study population and the comparison group members on measured characteristics, employment rates, and levels of earnings during the 12 months before the start of the training spell. There are few if any differences in these characteristics over the 3 years before the start of the training spell.

The analysis of pre-training to post-training earnings growth in this paper focuses on earnings in the year after the completion of the qualification. The bottom panel of Table 4 shows that the study population and comparison group had similar levels of employment in the year after completion, but the study population earned somewhat more on average. Men who gained a level 1 qualification had slightly lower average monthly earnings than the comparison group, but men and women who gained qualifications at all other levels had higher average monthly earnings. For example, the differences in log earnings growth over the pre-training to post-training period are -0.015 log points for

men who gained a level 1 qualification, 0.024 log points for a level 2 qualification, 0.045 log points for a level 3 qualification, and 0.073 log points for a level 4 qualification.

In the next section, we complement the information provide in this section with a short graphical comparison of the pre-training and post-training employment and earnings of the study population and comparison group.

Table 4: Characteristics of study population and matched comparison group, by level of highest qualification gained and sex

	Limited credit programme				Level 1				Level 2			
	Female		Male		Female		Male		Female		Male	
Characteristic	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**
Number of observations	4,400	17,760	3,510	13,370	1,800	6,710	2,130	8,220	4,570	17,680	5,520	22,060
Employment and earnings during the 12 months before training												
Employed every month (%)	83.1	81.2	82.3	81.9	80.7	78.9	76.7	73.4	76.8	77.1	73.4	75.7
Employed at least 6 months (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean months employed	11.6	11.6	11.6	11.6	11.5	11.5	11.4	11.4	11.4	11.5	11.4	11.5
Mean monthly earnings ($)	2,380	2,340	4,040	3,940	2,590	2,560	3,860	3,810	2,430	2,380	3,690	3,630
Employment and earnings during the 3 years before training												
Employed every month (%)	51.3	52.9	58.4	57.0	53.0	51.2	52.2	49.6	45.1	46.4	45.3	49.2
Employed for at least 18 months (%)	91.3	92.4	93.6	94.0	95.0	95.3	96.8	96.1	92.4	91.9	94.1	94.3
Mean months employed	31.5	31.8	32.5	32.4	32.2	32.3	32.6	32.4	31.2	31.2	32.0	32.1
Mean monthly earnings	2,347	2,336	3,988	3,914	2,540	2,586	3,860	3,840	2,371	2,351	3,701	3,664
Benefit receipt during 3 years before training												
Received benefit income (%)	26.3	25.7	14.0	15.5	34.6	29.9	28.8	27.2	31.1	27.4	24.0	22.5
Mean months on benefit	4.4	4.3	1.3	1.5	5.5	5.0	2.9	2.5	4.3	4.1	2.0	2.0
Mean months on benefit (if received any benefit)	16.6	16.9	9.6	9.9	15.8	16.6	9.9	9.3	13.9	14.8	8.2	8.9
Self-employment during 3 years before training												
Received income for self-employment (%)	12.5	15.0	15.6	16.9	10.7	14.2	11.2	12.4	11.3	13.2	13.5	14.8
Mean months received income from self-employment	2.8	3.4	3.2	3.7	2.3	3.1	2.1	2.6	2.2	2.9	2.7	3.2
Mean months received income from self-employment (if received any income)	22.8	22.5	20.4	21.9	21.6	21.7	18.4	20.5	19.9	22.1	19.6	21.8
Mean monthly income from self-employment ($)	45	69	42	92	35	45	12	41	28	68	34	76
Mean monthly income from self-employment (if received any income) ($)	488	617	461	733	452	442	176	488	359	660	425	713

Characteristic	Limited credit programme				Level 1				Level 2			
	Female		Male		Female		Male		Female		Male	
	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.
Employment and earnings during the first year after completion												
Employed every month (%)	83.0	80.5	83.6	80.3	76.7	76.0	68.3	72.5	78.3	76.0	74.1	74.6
Employed at least 6 months (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean months employed	11.6	11.5	11.6	11.5	11.4	11.4	11.2	11.3	11.4	11.3	11.4	11.4
Mean monthly earnings ($)	2,608	2,562	4,311	4,167	2,749	2,742	3,942	4,041	2,740	2,610	4,014	3,896
Self-employment during the first year after completion (Only for those who completed their training spell before April 2008)												
Received income for self-employment (%)	9.1	10.4	9.8	11.5	7.3	9.8	7.2	9.6	7.5	10.5	8.9	10.4
Mean monthly income from self-employment ($)	30.4	69.0	28.4	94.1	28.2	49.8	18.2	44.7	26.9	74.0	38.9	78.5
Mean monthly income from self-employment (if received any income) ($)	410	725	405	902	420	587	299	549	421	788	576	858
Dependent variable												
Log of average monthly earnings from wages and salary before training	7.658	7.640	8.205	8.183	7.736	7.723	8.215	8.204	7.674	7.652	8.139	8.122
Log of average monthly earnings from wages and salary after training	7.755	7.715	8.274	8.231	7.798	7.772	8.233	8.254	7.809	7.742	8.233	8.192
Change in log monthly earnings from wages and salary	0.097	0.075	0.069	0.047	0.062	0.049	0.017	0.050	0.135	0.090	0.094	0.071
Difference in the change in log earnings	0.022	…	0.021	…	0.013	…	-0.032	…	0.045	…	0.024	…

Table 4 is continued over the page.

Table 4 *continued*

Characteristics	Level 3				Level 4				Level 5+			
	Female		Male		Female		Male		Female		Male	
	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.
Number of observations	4,200	15,230	5,810	21,650	2,490	9,250	6,440	23,240	350	1,380	900	3,590
Employment and earnings during the 12 months before training												
Employed every month (%)	82.8	82.3	88.4	87.5	83.8	83.8	84.9	84.3	88.1	88.8	94.9	94.8
Employed at least 6 months (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean months employed	11.6	11.6	11.7	11.7	11.6	11.6	11.6	11.7	11.7	11.7	11.9	11.9
Mean monthly earnings ($)	2,810	2,770	4,180	4,110	3,270	3,220	4,030	3,970	4,200	4,070	6,320	6,070
Employment and earnings during the 3 years before training												
Employed every month (%)	52.2	53.3	63.3	62.9	54.9	55.2	59.2	59.5	65.7	63.9	86.0	81.5
Employed for at least 18 months (%)	93.4	93.3	95.7	95.4	95.4	94.6	95.3	94.6	97.5	95.2	98.0	97.5
Mean months employed	32.0	32.0	33.2	33.0	32.6	32.4	33.0	32.6	33.6	33.3	34.9	34.6
Mean monthly earnings ($)	2,782	2,748	4,160	4,120	3,257	3,210	4,086	4,028	4,156	4,054	6,425	6,161
Benefit receipt during 3 years before training												
Received benefit income (%)	21.7	21.5	12.1	13.2	19.0	18.2	12.6	14.4	11.0	11.0	1.9	3.0
Mean months on benefit	3.0	3.0	0.9	1.1	2.0	2.1	0.8	1.2	1.1	1.4	0.1	0.2
Mean months on benefit (if received any benefit)	13.9	13.8	7.5	8.4	10.8	11.3	6.5	8.4	9.9	12.6	7.3	7.3
Self-employment during 3 years before training												
Received income for self-employment (%)	12.5	14.9	14.7	16.8	15.0	16.8	16.2	18.3	19.0	20.3	23.6	26.0
Mean months received income from self-employment	2.5	3.2	2.9	3.6	3.2	3.7	3.5	4.0	4.3	4.6	5.5	6.7
Mean months received income from self-employment (if received any income)	19.9	21.2	19.9	21.3	21.0	22.0	21.5	22.1	22.8	22.7	23.2	25.8
Mean monthly income from self-employment ($)	26	55	48	91	63	89	57	115	22	74	11	48
Mean monthly income from self-employment (if received any income) ($)	334	514	555	738	601	674	529	832	167	472	77	310

Characteristics	Level 3				Level 4				Level 5+			
	Female		Male		Female		Male		Female		Male	
	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.
Employment and earnings during the first year after completion												
Employed every month (%)	83.9	80.0	88.7	84.5	82.9	80.5	84.7	82.2	85.6	85.3	93.7	91.9
Employed at least 6 months (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean months employed	11.5	11.4	11.7	11.6	11.5	11.5	11.6	11.5	11.7	11.6	11.9	11.8
Mean monthly earnings ($)	3,264	3,123	4,660	4,481	3,749	3,573	4,743	4,460	4,840	4,477	6,853	6,431
Self-employment during the first year after completion												
Received income for self-employment (%)	7.9	11.4	9.6	12.2	11.5	13.6	12.8	14.9	14.1	16.4	16.4	20.3
Mean monthly income from self-employment ($)	29.6	67.3	57.4	119.7	73.7	102.9	83.2	163.0	43.1	125.5	26.6	76.4
Mean monthly income from self-employment (if received any income) ($)	473	681	679	1,106	784	866	830	1,214	355	910	193	414
Dependent variable												
Log of average monthly earnings from wages and salary before training	7.835	7.820	8.275	8.259	8.003	7.989	8.223	8.209	8.238	8.210	8.721	8.678
Log of average monthly earnings from wages and salary after training	8.000	7.926	8.398	8.337	8.154	8.074	8.415	8.327	8.385	8.279	8.802	8.726
Change in log monthly earnings from wages and salary	0.165	0.107	0.123	0.078	0.151	0.086	0.192	0.118	0.147	0.068	0.082	0.048
Difference in the change in log earnings	0.059	…	0.045	…	0.065	…	0.073	…	0.079	…	0.033	…

Table 4 *continued*

Characteristics	Did not complete a qualification or a LCP			
	Female		Male	
	Study	Comp.	Study	Comp.
Number of observations	13,980	50,620	26,920	97,860
Employment and earnings during the 12 months before training				
Employed every month (%)	78.1	78.8	79.9	81.1
Employed at least 6 months (%)	100.0	100.0	100.0	100.0
Mean months employed	11.4	11.5	11.5	11.6
Mean monthly earnings ($)	2,620	2,580	3,850	3,790
Employment and earnings during the 3 years before training				
Employed every month (%)	41.0	49.7	47.6	54.7
Employed for at least 18 months (%)	92.2	92.8	94.2	94.1
Mean months employed	31.0	31.6	32.0	32.2
Mean monthly earnings ($)	2,584	2,598	3,829	3,809
Benefit receipt during 3 years before training				
Received benefit income (%)	29.8	24.7	21.4	18.4
Mean months on benefit	4.3	3.6	1.9	1.7
Mean months on benefit (if received any benefit)	14.3	14.4	8.7	9.4
Self-employment during 3 years before training				
Received income for self-employment (%)	13.5	15.2	15.8	16.6
Mean months received income from self-employment	2.6	3.3	3.1	3.5
Mean months received income from self-employment (if received any income)	19.6	21.5	19.4	21.3
Mean monthly income from self-employment ($)	41	67	59	107
Mean monthly income from self-employment (if received any income)	448	593	594	853
Employment and earnings during the first year after completion				
Employed every month (%)	75.7	77.5	76.5	79.4
Employed at least 6 months (%)	100.0	100.0	100.0	100.0
Mean months employed	11.3	11.4	11.3	11.4
Mean monthly earnings ($)	2,909	2,917	4,147	4,147
Self-employment during the first year after completion				
Received income for self-employment (%)	10.2	11.4	10.8	12.6
Mean monthly income from self-employment ($)	47.0	74.8	74.1	134.4

Characteristics	Did not complete a qualification or a LCP			
	Female		Male	
	Study	Comp.	Study	Comp.
Mean monthly income from self-employment (if received any income) ($)	540	736	830	1,193
Dependent variable				
Log of average monthly earnings from wages and salary before training	7.747	7.730	8.173	8.159
Log of average monthly earnings from wages and salary after training	7.848	7.841	8.244	8.242
Change in log monthly earnings from wages and salary	0.101	0.111	0.071	0.083
Difference in the change in log earnings	-0.010	…	-0.013	…

Notes: Comp. =comparison group; LCP = limited credit programme.

3.4.3 Comparison of labour market outcomes pre- and post-training

Next, we provide a short graphical comparison of the pre-training and post-training employment and earnings of the study population and comparison group.

Figure 2 in Appendix B plots the employment rates of the study population and comparison group members, by the level of the qualification obtained, in the 4 years before and 3 years after the training spell.

Recall that by construction, all trainees and comparison group members are employed in the first month of the training period, and all trainees are employed in the last month of the training period, although this is not necessary the case for members of the comparison group. Post-training employment rates peak in the months immediately before and after the end of the training period, for both the trainees and the comparison group. This reflects our selection criteria, which required that everyone had at least 6 months of employment in the 12 months before the training period and in the 12 months afterwards.

The graphs show outcomes relative to the start and end of the training spell. Month 0 represents the first and last month of training, while months -1 to -48 cover the 48 months before training started, and months +1 to +48 the 48 months after completing training. We have complete data for every sample member for the period -45 to +12. Outside that period, the outcomes shown use the available data for individuals who finished training earlier in the study period.

These graphs show that employment rates were very similar for the trainees and comparison group members in the 48 months before the start of the training period for those who gained level 1–3 qualifications, completed a limited credit programme, or gained no qualifications. Employment was slightly higher for trainees who gained a qualification at level 4 or above during the 13–48 months before training. Employment rates in the 13–48 months after training were similar or slightly higher, with the exception of those who gained a level 3 qualification, where the employment rate diverged slightly and was about 5 percentage point higher rates 36 months afterwards.

Figure 3 in Appendix B plots the employment rates of the wider 'employment' study population and comparison group members, by the level of qualification obtained, in the 4 years before and 4 years after the training spell. Recall that trainees and comparison group members in this population have no restriction on post-training employment.

Employment rates decreased in the month immediately after the training spell ends. This is largely a consequence of how participation in training is defined, in that trainees who are no longer employed are deemed to have ceased training (if only temporarily). In most cases, employment rates for trainees in the month immediately after training ended were around 90 percent, and similar or slightly lower among comparison group members. Employment rates were slightly higher for trainees who gained a level 2, 4, or 5 and above qualification or completed a limited credit programme 12 months after the training spell ended. For trainees who gained a level 3 qualification, employment was about 8 percentage points higher during the 48 months afterwards relative to those in the comparison group.

Figure 1 plots the average monthly earnings of study population and matched comparison group members, by the level of the qualification gained and sex, in the 4 years before and after the training period. People who were not in paid work (and had zero earnings) in any given month are excluded from the average earnings calculations.

For females who completed a limited credit programme or gained a level 1 certificate, average monthly earnings were essentially the same before and after the training period. For females who gained a qualification at level 2 or above, average monthly earnings were essentially the same in the months before the training period, but higher in the 12 months afterwards. (Recall that we have complete data for every sample member for the period -45 to +12 months. Outside that period, the outcomes shown use the available data for individuals who finished training earlier in the study period.) For males who completed a limited credit programme, average monthly earnings were slightly higher before training and somewhat higher afterwards. For males who completed a level 1 qualification, average monthly earnings were essentially the same before and after training. For males who completed a qualification at level 2 or 3, average monthly earnings were the same during the 13–48 months before the training, but slightly higher during the 12 months before, and somewhat higher afterwards.

For men who gained a qualification at level 4 or above, average monthly earnings were essentially the same before training and higher in the 12 months afterwards. There is no indication that average earnings of trainees and comparison group members converge over the following 36 months.

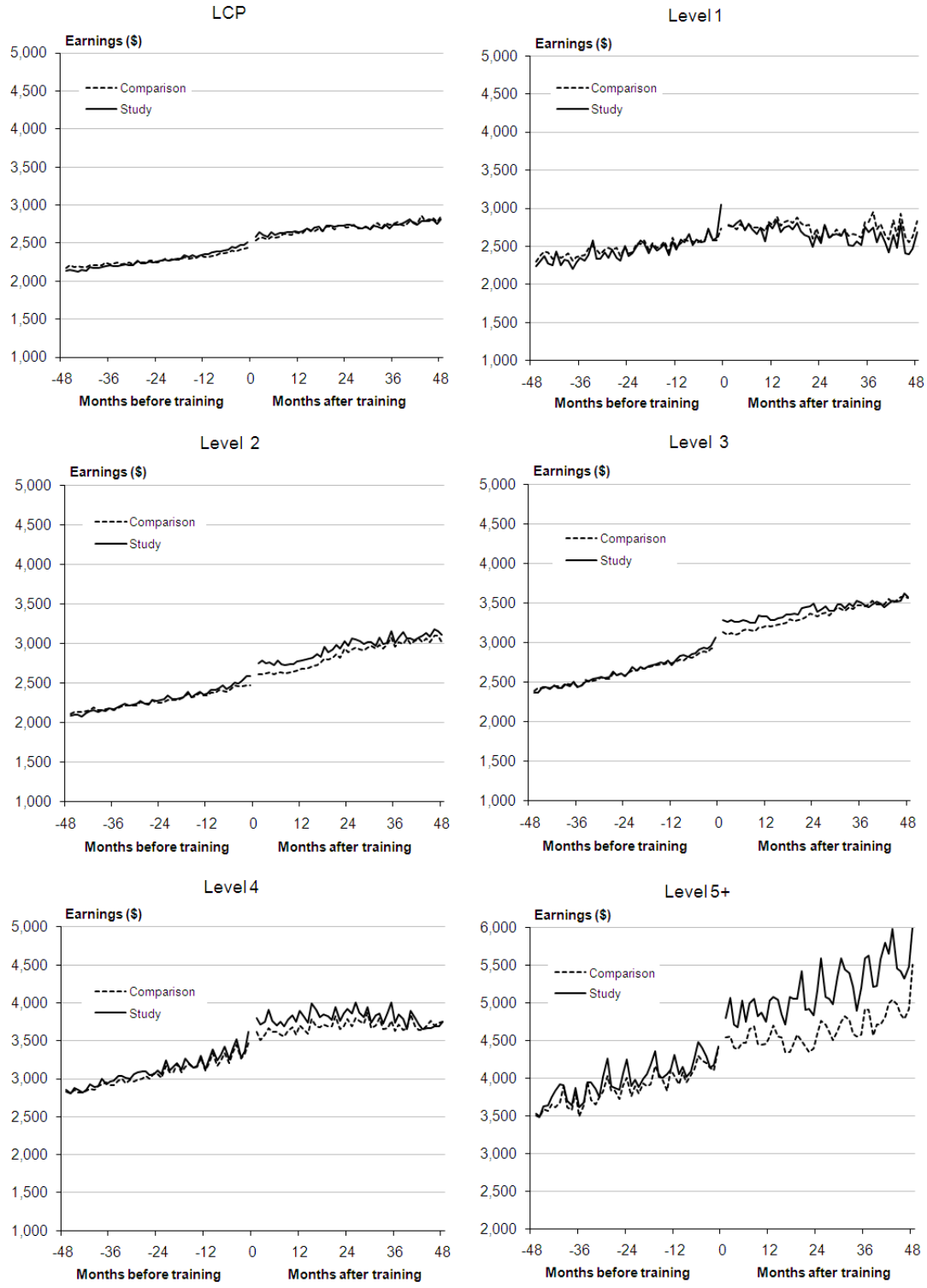
Figure 4 in Appendix B, compares average monthly earnings for those who started and completed training during 2003–2005, which those in the matched comparison group. For these groups we have complete data for every sample member for the period -45 to +36. The average monthly earnings of females who gained level 3 or 4 qualifications were similar to those of the comparison group, while the average monthly earnings of females who gained level 2 qualifications were higher on average than those of the comparison group initially, but converged to those of the comparison group around 30 months after the end of the training period. Results for men were more similar to all those who started and completed training during 2003–2008.

Figure 4 in Appendix B plots the average monthly earnings of study population and matched comparison group members, for those who did not gain a qualification, by sex, and the level of the programme they first enrolled in, in the 4 years before and after the training spell, for all training spells during 2003–2008. For males and females, at all levels, average monthly earnings were essentially the same before and after the training period.

Taken together, the descriptive results presented in this and the previous section suggest that trainees who gained a qualification at level 2 or above had higher average monthly earnings than the matched non-trainees over the 3 years after the qualification was completed, and that those who gained a qualification at higher levels improved their earnings the most on average.

Figure 1: Average monthly earnings in the months before and after the training spell, main study population, by highest qualification gained and sex

Female

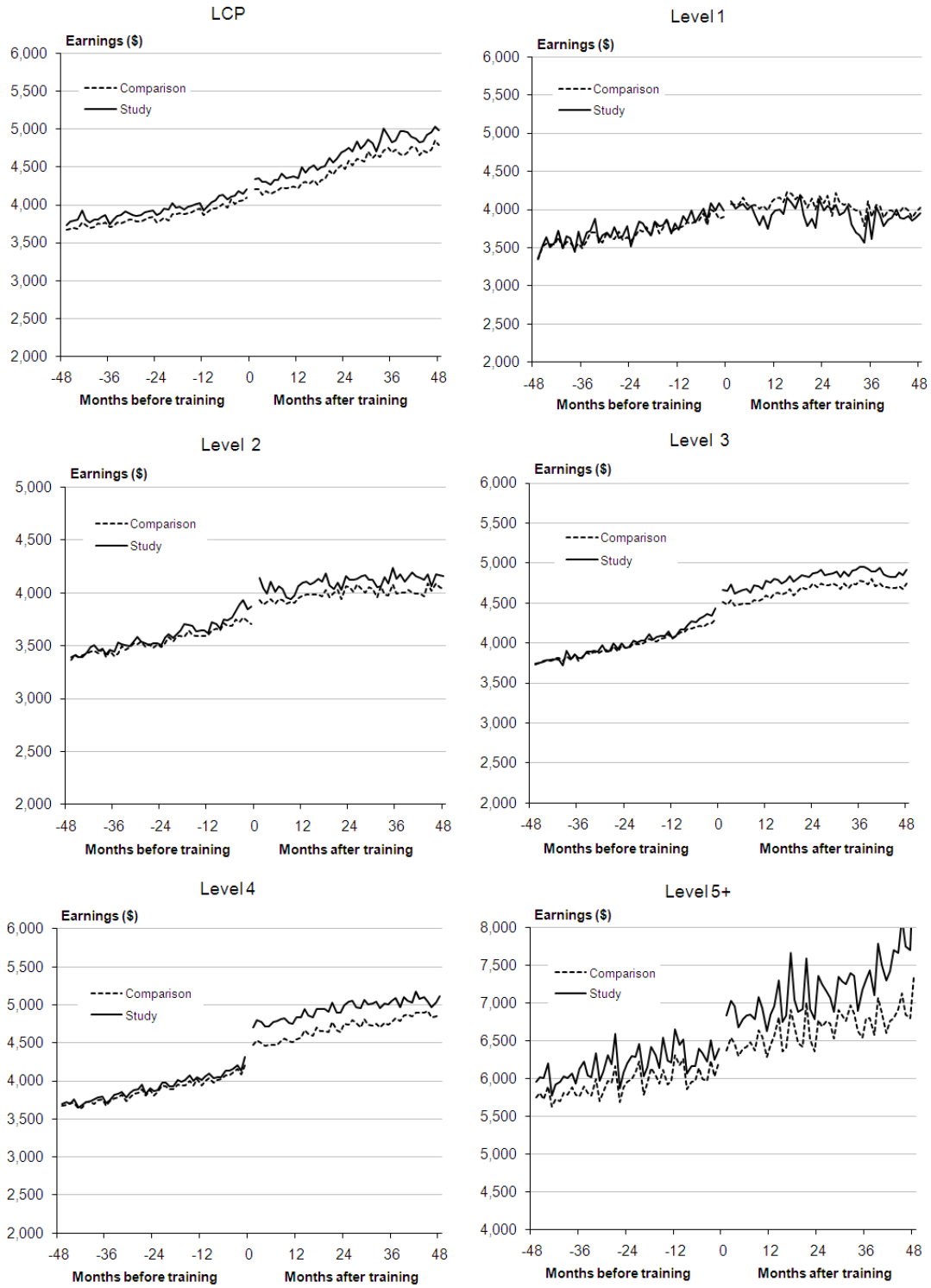


Note: LCP = limited credit programme.

Figure 1 is continued over the page.

Figure 1 *continued*

Male



Note: LCP = limited credit programme.

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

We next 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, sex, the field of study, and the ITO overseeing the training.

We describe our regression models in section 3.5.1 and present the main set of results in section 3.5.2. Those main results give our estimates of the impact of gaining a qualification on employment status and earnings growth for all trainees at each level of qualification, and for subgroups defined by sex and age group.

In section 3.5.3 we examine variations in impacts by broad field of study and describe variations by ITO. Confidentiality requirements prevent us from reporting results for individual ITOs, so we discuss only the degree of variation observed. We also present additional results for age–sex groups controlling for ITO. In section 3.5.4 we present additional results that control for differences in employment intensity during the training period between the study and comparison group. In section 3.5.5 we compare results for early and later parts of the 2003–2008 period, and for those who completed training by the end of 2005, we consider outcomes in the third year after completing training, and include income from self-employment. Finally, some of the limitations of the study and results are discussed in section 3.5.6.

3.5.1 Regression framework

Our strategy is to regress our preferred measure of pre-training to post-training earnings growth on a set of control variables, including a dummy variable that indicates whether the individual participated in training. 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. All our regression models are estimated separately for each qualification level (that is, level 1, level 2, level 3, level 4, and levels 5 and above), for those who completed a limited credit programme, and, finally, for those who did not gain a qualification or complete a limited credit programme.

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 training spell, X is a vector of variables describing individual characteristics before the training spell, T is an indicator of whether the individual participated in training, and δ is an overall 'treatment effect' coefficient that captures the difference in earnings growth between the study population and comparison group.

More specifically, the dependent variable is the change in the log of average monthly earnings from the first period (12 months before training) to the second period (12 months after completion of training). If no individual characteristics are included in the model, the estimated impact is just the average difference in the dependent variable between the study population and comparison group.

Age and sex are not included as control variables (X_i) in the base regression model because the study population and comparison groups were almost perfectly matched on these characteristics at the case selection stage. Recall that the study population and comparison group are also matched on employment status and earnings during the 12 months before the training period started.

In subsequent regressions, we introduce interactions between *T* and individual characteristics to estimate the treatment effect for different age and sex 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 a set of age-group indicators, a set of indicators that reflect the number of credits gained, and a set of ITO indicators. We include four age-group dummy variables rather than modelling age as a continuous variable because we are interested in estimating average effects for these subgroups. We include an ITO (or field of study) specific indicator in cases where there were at least 100 trainees who gained a qualification at a given level. We interact *T* with the sex, age group, and ITO (or field of study) indicators. This regression specification enables us to estimate the effects of gaining a qualification for a particular sex or age group while controlling for any differences between the groups in distribution across ITO. Similarly, we can identify the effects of gaining a qualification overseen by a particular ITO, while controlling for the effects of any differences in the age and sex profiles of the trainees in the different fields. The parameters of interest are those associated with the interaction of *T* with credits, age group, sex, and ITO (that is, δ, which captures the difference in earnings growth between the study population and comparison group).

Section 3.5.2 and Table 5 present the results obtained using the basic regression model, showing the impact of gaining a qualification for the entire study population, for each level, each sex, and six age–sex groups.[16]

Section 3.5.3 and Table 6 present results for each sex and the six age–sex groups obtained from the extended regression model that includes controls for differences by the number of credits gained and ITO. In section 3.5.4 we include a control for employment intensity during the training period in the basic regression model.

Our main results are those obtained from the basic regression model. The reasons we prefer these results over those that control for ITO and the number of credits achieved, and employment intensity during the training period are discussed in section 3.5.3.

[16] We subsequently included controls for location (74 territorial local authorities) and tenure in the month the training started, and employment experience during the 36 months before training started. None of these additional controls materially changed the estimates.

3.5.2 Main results

Impacts by level of qualification, age, and sex

The results in Table 5 indicate that trainees who completed a qualification at level 2 or above had greater earnings growth than the comparison group during the training period and the first year afterwards. The trainees' average monthly earnings were 3–7 percent higher on average by the year after completion of training. Those who did not gain a qualification, but completed a limited credit programme (typically at level 2 or 3) experienced 2 percent higher earnings growth on average.

Trainees who completed a level 1 qualification and those who did not gain a qualification or complete a limited credit programme, had 1 percent lower earnings growth than the comparison group on average.

There were substantial differences in the impacts for males and females and for different sex–age groups. The key results are shown in Table 5.

In the rest of this discussion, we discuss only estimates that were significantly different from zero using the 95 percent confidence criterion.

Completed a qualification at level 1

On average, men who completed a level 1 qualification experienced small earnings losses relative to the comparison group. The size of the estimated loss was similar for the three older age groups at 3–4 percent, but men aged 20–24 did not significantly improve or reduce their earnings compared with the comparison group. Women who completed a level 1 qualification did not significantly improve or reduce their earnings compared with the comparison group, and this was true for women in all age groups except those aged 25–34 who experienced 5 percent greater earnings growth than the comparison group.

Completed a qualification at level 2

Both men and women who completed a qualification at level 2 experienced greater earnings growth than the comparison group on average. Women experienced 4.5 percent higher earnings growth on average. Those aged 25–64 experienced significantly higher earnings growth on average of 3–8 percent, but those aged 20–24 did not significantly improve their earnings compared with the comparison group. Men experienced 2.5 percent higher earnings growth on average, and men in all four age groups experienced significant improvements of 2–4 percent.

Completed a qualification at level 3

With a level 3 qualification, men experienced 4.5 percent higher earnings growth and women 6 percent on average. Men and women in all age groups experienced significant improvements in their relative earnings. The estimated earnings premium was greater for men aged 20–24 and women aged 20–34 at about 7 percent, and lower for women aged 35–64 and men aged 25–64 at about 4 percent.

Table 5: Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained, age, and sex, study population and matched comparison group

	Did not gain a qualification or complete a LCP			LCP			Level 1			Level 2			Level 3			Level 4			Level 5+		
	Est	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**
All	**-0.012**	0.002	40,920	**0.022**	0.003	7,910	**-0.011**	0.004	3,930	**0.033**	0.003	10,100	**0.051**	0.003	10,010	**0.071**	0.003	8,930	**0.046**	0.006	1,250
Sex																					
Female	**-0.010**	0.004	13,980	**0.022**	0.005	4,400	0.013	0.008	1,800	**0.045**	0.005	4,570	**0.059**	0.006	4,200	**0.065**	0.007	2,490	**0.079**	0.016	350
Male	**-0.013**	0.002	26,920	**0.021**	0.004	3,510	**-0.032**	0.005	2,130	**0.024**	0.004	5,520	**0.045**	0.003	5,810	**0.073**	0.004	6,440	**0.033**	0.006	900
Sex & age (years)																					
Female																					
20–24	**-0.020**	0.010	2,860	**0.080**	0.024	440	-0.023	0.036	90	0.014	0.015	950	**0.065**	0.017	750	**0.117**	0.023	430	s	s	s
25–34	0.003	0.008	3,700	-0.003	0.014	780	**0.049**	0.022	290	**0.077**	0.012	1,040	**0.077**	0.010	1,240	**0.048**	0.014	740	**0.127**	0.038	90
35–44	-0.011	0.007	3,740	0.010	0.009	1,170	-0.008	0.013	570	**0.035**	0.009	1,200	**0.040**	0.010	1,050	**0.070**	0.011	760	0.048	0.025	120
45–64	**-0.012**	0.006	3,680	**0.026**	0.006	2,000	0.019	0.011	840	**0.051**	0.009	1,370	**0.051**	0.009	1,150	**0.041**	0.012	570	**0.084**	0.025	130
Male																					
20–24	**-0.013**	0.005	5,830	0.028	0.017	460	0.003	0.017	310	**0.036**	0.012	1,130	**0.069**	0.014	830	**0.151**	0.010	1,610	s	s	s
25–34	**-0.012**	0.003	8,320	**0.028**	0.008	860	**-0.043**	0.010	610	**0.026**	0.006	1,640	**0.043**	0.006	1,790	**0.066**	0.006	2,130	**0.055**	0.016	150
35–44	**-0.012**	0.003	7,040	**0.016**	0.007	880	**-0.033**	0.009	600	**0.012**	0.006	1,350	**0.039**	0.005	1,690	**0.042**	0.006	1,520	**0.018**	0.010	310
45–64	**-0.014**	0.003	5,730	**0.019**	0.006	1,310	**-0.039**	0.009	610	**0.023**	0.005	1,400	**0.043**	0.005	1,490	**0.020**	0.006	1,180	**0.026**	0.008	420

Notes: The dependant variable is change in log average monthly earnings over the 12 months before training started and the 12 months after training ended. Estimates (Est) 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). 'N' refers to the number of trainees in the study population. LCP = limited credit programme; SE = standard error; s = suppressed.

Completed a qualification at level 4

Men and women experienced similar earnings growth on average at 7 percent. Men and women in all age groups experienced significant improvements in their relative earnings, but there was substantial variation by age and sex. The estimated earnings premium was greatest for men and women aged 20–24 at about 15 percent and 12 percent respectively and lowest for men aged 45–64 at about 2 percent.

Completed a qualification at level 5 and above

Women experienced 8 percent higher earnings growth on average and men 3 percent on average. Relatively few trainees completed a qualification at this level, so estimates for most sex–age groups are not precisely estimated. The results indicate that men and women aged 25–34 may have experienced greater earnings benefits than those aged 35–64, but differences by age within sex are not statistically significant.

Completed a limited credit programme

Both men and women who completed a limited credit programme experienced 2 percent greater earnings growth than the comparison group on average. Women aged 20–24 experienced particularly higher earnings growth of 8 percent on average, while those aged 25–34 did not significantly improve their earnings compared with the comparison group. Men aged 20–24 did not significantly improve their earnings compared with the comparison group, while men in the other three age groups experienced significant improvements of about 2–3 percent.

Did not gain a qualification or complete a limited credit programme

On average, both males and females who did not gain a qualification or complete a limited credit programme experienced small earnings penalties relative to the comparison individuals of about 1 percent. For females aged 20–24 the penalty was slightly greater at 2 percent, while females aged 25–44 experienced no significant effect. Females aged 45–64 and males in all age four groups experienced an earning loss of about 1 percent.

3.5.3 Variations in impacts

In this section we examine the extent to which the effect of gaining a qualification varies by sex and age, the numbers of credits gained, and the ITO overseeing the training. The results are obtained from the extended regression model, which included age group, number of credits, and ITO (or field of study) and their interaction with the training indicator.

The regression analysis enables us to estimate the effects of gaining a qualification for a particular age–sex group while controlling for any differences between the age–sex groups in their distribution across ITOs, and in the number of credits achieved.

All our regression models are estimated separately for each qualification level (that is, level 1, level 2, level 3, level 4, and levels 5 and above), for those who completed a limited credit programme, and finally for those did not gain a qualification or complete a limited credit programme.

In all cases the variations by age–sex and ITO was statistically significant, after controlling for the other variables in the model, but variations by the number of credits achieved was significant only for qualifications at levels 2 and 4. Table 6 presents results for each of the six age–sex groups. These results and variations by the number of credits gained and ITO are discussed in the remainder of this section. In section 3.5.4, we include a control for employment intensity during the training period in the basic regression model.

Note that our main results (section 3.5.2), which we present in the summary and conclusion, are those obtained from the basic regression model. We prefer these results over those that control for the ITO overseeing the training or the field of study, and, in the case of qualifications at levels 2 and 4, the number of credits achieved. This is because for some ITOs, or fields of study, nearly all the trainees were male, so we think the regression adjustment would be imprecise and might not adequately deal with sex differences. In addition, we are not able to provide results for individual ITOs, so the analysis based on the extended regression model is somewhat incomplete.

Variations by age and sex

Overall, controlling for the numbers of the credits gained and the ITO overseeing the training had relatively limited impact on the variation by sex and age. In general the effect for women became slightly larger and the effects for men smaller.

The largest impact was observed for level 4 qualifications where the impact of training on earnings increased for women from 6.5 percent to 8.4 percent and decreased for men from 7.3 percent to 6.6 percent. The effect for women who gained a level 1 qualification increased from 1.3 percent to 1.9 percent (now statistically significant) and became more negative for men (-3.2 percent to -3.7 percent.) The effects for women who completed a limited credit programme also increased from 2.2 percent to 3.1 percent and decreased for men from 2.1 percent to 1.1 percent. In contrast, the effects for women who completed a qualification at level 5 and above decreased from 7.9 percent to 6.4 percent and increased for men from 3.3 percent to 3.9 percent. The results for qualifications at levels 2 and 3 were essentially the same as previously. All results are shown in table 6.

Table 6: Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained and sex

Highest qualification gained	Number of trainees	Training spells 2003–2008			
		First year post-training			
		Unadjusted		Adjusted for ITO and number of credits	
		Est	SE	Est	SE
Limited credit programme					
Female	4,400	**0.022**	0.005	**0.031**	0.004
Male	3,510	**0.021**	0.004	**0.011**	0.005
Female aged 20–24	440	**0.080**	0.024	**0.090**	0.014
Female aged 25–34	780	-0.003	0.014	0.003	0.011
Female aged 35–44	1,170	0.010	0.009	**0.018**	0.009
Female aged 45–64	2,000	**0.026**	0.006	**0.036**	0.008
Male aged 20–24	460	0.028	0.017	0.026	0.014
Male aged 25–34	860	**0.028**	0.008	0.018	0.011
Male aged 35–44	880	**0.016**	0.007	0.000	0.011
Male aged 45–64	1,310	**0.019**	0.006	0.007	0.009
Level 1					
Female	1,800	0.013	0.008	**0.019**	0.007
Male	2,130	**-0.032**	0.005	**-0.037**	0.006
Female aged 20–24	90	-0.023	0.036	-0.020	0.029
Female aged 25–34	290	**0.049**	0.022	**0.050**	0.017
Female aged 35–44	570	-0.008	0.013	-0.004	0.012
Female aged 45–64	840	0.019	0.011	**0.028**	0.011
Male aged 20–24	310	0.003	0.017	-0.004	0.016
Male aged 25–34	610	**-0.043**	0.010	**-0.045**	0.012
Male aged 35–44	600	**-0.033**	0.009	**-0.037**	0.012
Male aged 45–64	610	**-0.039**	0.009	**-0.047**	0.012
Level 2					
Female	4,570	**0.045**	0.005	**0.043**	0.004
Male	5,520	**0.024**	0.004	**0.025**	0.004
Female aged 20–24	950	0.014	0.015	0.015	0.010
Female aged 25–34	1,040	**0.077**	0.012	**0.070**	0.009
Female aged 35–44	1,200	**0.035**	0.009	**0.032**	0.009
Female aged 45–64	1,370	**0.051**	0.009	**0.053**	0.009
Male aged 20–24	1,130	**0.036**	0.012	**0.041**	0.009
Male aged 25–34	1,640	**0.026**	0.006	**0.024**	0.008
Male aged 35–44	1,350	0.012	0.006	0.012	0.008
Male aged 45–64	1,400	**0.023**	0.005	**0.026**	0.008
Level 3					
Female	4,200	**0.059**	0.006	**0.065**	0.005
Male	5,810	**0.045**	0.003	**0.041**	0.004
Female aged 20–24	750	**0.065**	0.017	**0.061**	0.011
Female aged 25–34	1,240	**0.077**	0.010	**0.076**	0.009
Female aged 35–44	1,050	**0.040**	0.010	**0.048**	0.010
Female aged 45–64	1,150	**0.051**	0.009	**0.072**	0.010
Male aged 20–24	830	**0.069**	0.014	**0.065**	0.011
Male aged 25–34	1,790	**0.043**	0.006	**0.038**	0.007
Male aged 35–44	1,690	**0.039**	0.005	**0.034**	0.008
Male aged 45–64	1,490	**0.043**	0.005	**0.038**	0.008
Level 4					
Female	2,490	**0.065**	0.007	**0.084**	0.006
Male	6,440	**0.073**	0.004	**0.066**	0.005
Female aged 20–24	430	**0.117**	0.023	**0.125**	0.016
Female aged 25–34	740	**0.048**	0.014	**0.065**	0.011
Female aged 35–44	760	**0.070**	0.011	**0.093**	0.011
Female aged 45–64	570	**0.041**	0.012	**0.068**	0.014
Male aged 20–24	1,610	**0.151**	0.010	**0.126**	0.008

Highest qualification gained	Number of trainees	Training spells 2003–2008			
		First year post-training			
		Unadjusted		Adjusted for ITO and number of credits	
		Est	SE	Est	SE
Male aged 25–34	2,130	**0.066**	0.006	**0.053**	0.007
Male aged 35–44	1,520	**0.042**	0.006	**0.042**	0.008
Male aged 45–64	1,180	**0.020**	0.006	**0.037**	0.009
Level 5+					
Female	350	**0.079**	0.016	**0.064**	0.012
Male	900	**0.033**	0.006	**0.039**	0.007
Female aged 20–34	120	**0.110**	0.037	**0.087**	0.024
Female aged 35–44	120	0.048	0.025	0.030	0.021
Female aged 45–64	130	**0.084**	0.025	**0.071**	0.021
Male aged 20–34	210	**0.081**	0.019	**0.059**	0.018
Male aged 35–44	260	**0.018**	0.010	0.024	0.012
Male aged 45–64	420	**0.026**	0.008	**0.038**	0.012

Notes: ITO = industry training organisation. Estimates in bold are significant at the 5 percent level.

Variations by field of study

Next we examine variation in impacts by broad field of study within level of qualification gained.[17] There was a high degree of correlation between the ITO administering the training and broad field of study, with many ITOs administered qualifications in only one or two fields, while others administered qualifications in several different fields. In most cases, trainees who gained qualifications in a particular broad field of study came from several different ITOs.

We report results by broad field of study, which meets the confidentiality rules and comprises a minimum of 100 trainees in Table 7. We focus of results by field of study adjusting for differences in the age–sex composition of trainees. However, this made relatively little difference to estimates in most cases. Overall, there was considerable variation in impacts by field of study, particularly for qualifications gained at level 4 and above.

No field-specific results could be reported for level 1, as relatively few ITOs offered qualifications at this level, so all results by field of study were required to be suppressed for confidentiality reasons.

Completed a qualification at level 2

Only three fields could be separately reported at level 2. Those who completed a level 2 qualification in food, hospitality and personal services or agriculture and environment or engineering and related technologies experienced a similar improvement in earnings on average of 2–3.5 percent. Note that a large number of qualifications were gained in management and commerce, but this result could not be reported for confidentiality reasons

Completed a qualification at level 3

Those who completed a qualification in society and culture or food, hospitality and personal services improved their earnings by 3–4 percent, those who gained

[17] Broad field of study was determined by the Ministry of Education based on the qualification name and the ITO administering the qualification.

a qualification in health and management or commerce improved their earnings by between 5 percent, and those with qualifications in agriculture, engineering and architecture improved their earnings by 6–7 percent.

Completed a qualification at level 4

Those who completed a level 4 qualification in society and culture did not experience any improvement in earnings on average, while a qualification in agriculture and environment, engineering and related technologies, or building and architecture improved their earnings by 9–12 percent. Trainees who gained qualifications in the three other fields that could be separately improved their earnings by 4.5–6.5 percent.

Completed a qualification at level 5 and above

Those who gained a qualification at level 5 or above in society and culture did not experience any improvement in earnings on average, while a qualification in management and commerce or engineering and related technologies improved their earnings by 7 percent and 5 percent respectively.

Completed a limited credit programme

Only three fields could be separately reported for those who completed a limited credit programme. Note that there were a large number of trainees who completed programmes in the society and culture, health, and food, hospitality and personal services fields, which could not be reported for confidentiality reasons.

Those who completed a limited credit programme in management and commerce, and agriculture and the environment did not experience a significant improvement in earnings on average, while qualifications in engineering and related technologies improved their earnings by 4 percent.

Table 7: Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained and field of study

	Limited credit programme			Level 1			Level 2			Level 3			Level 4			Level 5+		
Major field of study	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**
Science	-	-	s	-	-	s	-	-	s	-	-	s	-	-	s	-	-	s
Information technology	-	-	s	-	-	s	-	-	s	-	-	s	-	-	s	-	-	s
Engineering & related technologies	**0.039**	0.007	2330	s	-	1210	**0.038**	0.009	1320	**0.064**	0.006	2610	**0.095**	0.006	2960	**0.050**	0.010	640
Architecture & building	-	-	s	-	-	s	-	-	s	**0.056**	0.013	530	**0.094**	0.010	1000	-	-	s
Agriculture & environment	0.034	0.020	220	-	-	s	**0.030**	0.010	980	**0.039**	0.013	560	**0.062**	0.010	910	-	-	s
Health	s	-	710	s	-	180	s	-	s	**0.051**	0.016	330	**0.120**	0.026	130	-	-	s
Education	-	-	s	-	-	s	-	-	s	-	-	s	s	-	100	-	-	s
Management & commerce	0.006	0.020	230	-	-	s	s	-	3430	**0.050**	0.005	3510	**0.045**	0.007	2230	**0.075**	0.015	250
Society & culture	s	-	2830	s	-	810	s	-	843	**0.026**	0.008	1680	0.007	0.016	380	0.016	0.019	150
Creative arts	-	-	s	-	-	s	-	-	s	-	-	s	-	-	s	-	-	s
Food, hospitality & personal services	s	-	1510	s	-	1680	**0.020**	0.005	3470	**0.071**	0.011	760	**0.065**	0.009	1170	-	-	s
Total	**0.022**	0.003	7,910	**-0.011**	.004	3,930	**0.033**	0.003	10,100	**0.051**	0.003	10,010	**0.071**	0.003	8,930	**0.046**	0.006	1,250

Notes: The dependant variable is change in log average monthly earnings over the 12 months before training started and the 12 months after training ended. Estimates in bold are statistically significant at the 5 percent level. 'N' refers to the number of trainees in the study population. Estimates that do not meet confidentiality and minimum sample size requirements have been suppressed (s); a hyphen (-) means not applicable where the estimate or sample size is suppressed.

Variations by the number of credits gained

There was considerable variation in the number of credits trainees achieved with a given qualification level. We examined the relationship between the number of credits gained during the training period and the earnings benefits experienced, by stratifying the sample into subgroups based on the numbers of credits.

Adjusting for age–sex, ITO and employment intensity over the training period, there was a significant relationship between the number of credits gained and the earnings benefits for those who gained level 2 or level 4 qualifications, but not at other levels.

Completed a qualification at level 4

Among those who gained level 4 qualifications, men gained more credits on average than women and there was a moderately strong relationship between the numbers of credits gained and age.

About one-quarter of men who completed level 4 qualifications gained 240 or more credits, one-third gained 120–239 credits, one-fifth gained 60–119 credits, and the remaining one-fifth gained less than 60 credits. Only 5 percent of women who completed level 4 qualifications gained 240 or more credits, one-third gained 120–239 credits, nearly half gained 60–119 credits, and the remaining one-fifth gained less than 60 credits.

Those who completed level 4 qualifications and gained more than 240 credits (approximately equivalent to 2 years of full-time study at a tertiary education institution) experienced 12 percent higher earnings growth on average, those who gained between 120 and 239 credits experienced 7 percent higher earnings growth on average, while those who gained less than 120 credits experienced 4.5 percent higher earnings growth on average.

Men who completed level 4 qualifications and gained more than 240 credits experienced 12 percent higher earnings growth on average, while men who gained less than 120 credits experienced 4.5 percent higher earnings growth on average.

Women who completed level 4 qualifications and gained more than 120 credits experienced 10 percent higher earnings growth on average, while women who gained less than 120 credits experienced 4.5 percent higher earnings growth on average (that is, the same as men.)

Adjusting for differences in the age–sex distribution of people with different levels of credit attainment, the relationship between the number of credits gained and the earnings benefits became slightly weaker, and those who gained more than 240 credits experienced 11.5 percent higher earnings growth on average, while those who gained less than 120 credits experienced 5 percent higher earnings growth on average. Adjusting for ITO in addition to age and sex weakened the relationship further, so that those who gained 240 or more 240 credits experienced 9.5 percent higher earnings growth on average, while those who gained less than 120 credits experienced 5 percent higher earnings growth on average.

Completed a qualification at level 2

Men gained more credits on average than women; nearly one-half of men and one-fifth of women gained 60 or more credits, and older men gained more credits on average than younger men.

Those who gained more 60 or more credits experienced 3.5 percent higher earnings growth on average, the same as those who gained less than 60 credits.

Men who gained more 60 or more credits experienced 2 percent higher earnings growth on average, the same as men who gained less than 60 credits. Women who gained 60 or more credits experienced 4.5 percent higher earnings growth on average, and women who gained less than 60 credits experienced 3 percent higher earnings growth on average.

Adjusting for differences in the age–sex distribution made little difference. Those who gained 60 or more credits experienced 4 percent higher earnings growth on average, while those who gained less than 60 credits experienced 3 percent higher earnings growth on average, a difference that was not statistically significant. However, adjusting for ITO in addition to age and sex revealed a relationship between number of credits and the impact of training on earnings growth; those who gained 60 or more credits experienced 6 percent higher earnings growth on average, while those who gained less than 60 credits experienced 2 percent higher earnings growth on average.

Lower level qualifications involved relatively few credits

The absence of more significant earnings impacts for level 1–2 qualifications may partly reflect that little training was needed to complete qualifications at these levels.

Many level 1 and 2 certificates required fewer than 60 credits to complete (the equivalent of approximately 6 months or less of full-time study). The average duration of training associated with qualifications at level 1 and 2 was about 6–12 months. The median number of credits achieved about 50, with 70 percent achieving fewer than 60 credits. In comparison level 3 qualifications typically involved 60–120 credits, and level 4 qualifications 60–240 credits.

There was no consistent relationship between the number of credits achieved and impact of gaining a qualification on earnings across all levels, although in the case of level 2 qualifications those who achieved 60 or more credit experienced greater benefits than those who achieved fewer than 60 credits. We did not find a relationship between the number of credits gained and the impact of gaining a qualification on earnings for those who gained level 1 or 3 qualifications.

Level 2 qualifications involved a similar number of credits and training duration as level 1 qualifications, but resulted in more widespread earnings benefits.

Variations by the industry training organisation overseeing the training

The impact of training varied substantially by the ITO administering the training. There are about 40 ITOs, which vary considerable in size, scope, and history. Some industries such as those in the traditional trades have a long history of training employees, including others that have only recently developed

qualifications and started training employees. Some occupations have a well-defined training pathway, closely linked to remuneration, but in other occupations and industries this is not the case. The incentives and potential rewards of participating in and completing training also vary substantially across industries. Much of the variation in impacts by ITO that we observed reflected these factors.

In this section, we quantify the degree of variation observed, but we do not identify results for individual ITOs, as confidentiality rules do not permit this.

We estimated the impacts for ITOs where at least 100 trainees completed a qualification at a given level. (Results based on fewer than 100 trainees are not included as they are considered unreliable.)

Completed a qualification at level 1

Overall, those who completed a level 1 qualification experienced earnings losses of about 1 percent relative to the comparison group.

Only four ITOs had 100 or more trainees, and of these one had just over 100 trainees, while the three others had 800–1,700.

Considering the results for individual ITOs without adjusting for age and sex, trainees from one of the ITOs experienced significantly lower earnings growth, while the earnings growth experienced by trainees from the three other ITOs were not significantly different from those of the comparison group on average.

After adjusting for difference in the age–sex composition of trainees across ITOs, trainees associated with two ITOs experienced significant earnings penalties of about 3 percent, while trainees associated with one ITO experienced significant higher earnings growth of about 2 percent. Trainees associated with the fourth ITO were not significantly different from those of comparison group on average.

Completed a qualification at level 2

Overall, those who completed a qualification at level 2 experienced 3 percent greater earnings growth compared with the comparison group on average.

Twelve ITOs had 100 or more trainees, and of these six had fewer than 300 trainees and five had over 700 trainees.

Considering the results for individual ITOs without adjusting for differences in the age–sex composition across ITOs, trainees from three ITOs experienced 7–10 percent higher earnings growth, trainees associated with four ITOs experienced about 2–4 percent higher earnings growth, trainees associated with two ITOs experienced 1 percent higher earnings growth, while trainees from the other three ITOs were not significantly different from those of the comparison group on average. Adjusting for differences in the age–sex composition across ITOs made no material difference to the results.

Completed a qualification at level 3

Overall, those who completed a qualification at level 3 experienced 5 percent greater earnings growth than the comparison group on average.

Sixteen ITOs had 100 or more trainees, and of these six had fewer than 300 trainees, and five had over 700 trainees.

Considering the results for individual ITOs without adjusting for the age–sex profile, trainees from five ITOs experienced 7–9 percent higher earnings growth, trainees associated with seven ITOs experienced about 4–6 percent higher earnings growth (and all were significantly different from zero), while the earnings growth of trainees associated with the other four ITOs were not significantly different from those of the comparison group on average. Adjusting for differences in the age–sex composition across ITOs made no material difference to the results.

Completed a qualification at level 4

Overall, those who completed a qualification at level 4 experienced 7 percent greater earnings growth than the comparison group on average.

Nineteen ITOs had 100 or more trainees, and of these seven had fewer than 300 trainees, and four had over 700 trainees. Considering the results for individual ITOs without adjusting for differences in the age–sex composition across ITOs, trainees from ten ITOs experienced 10–15 percent higher earnings growth, trainees from four ITOs experienced 5–9 percent higher earnings growth, and trainees from five ITOs experienced about 2–4 percent higher earnings growth. The earnings growth experienced by trainees associated with two ITOs were not significantly different from those of the comparison group on average. Adjusting for differences in the age–sex composition across ITOs increased the variation to some extent, but made little difference to the results.

Completed a qualification at level 5 and above

Overall, those who completed a qualification at level 5 or above experienced 5 percent greater earnings growth than the comparison group on average.

Five ITOs had 100 or more trainees and, of these, four had 100–200 trainees, and one had about 400 trainees.

Considering the results for individual ITOs without adjusting for differences in the age–sex composition across ITOs, trainees from three ITOs experienced 5–8 percent higher earnings growth, and trainees from the other two ITOs experienced 2 percent higher earnings growth (which in one case was not significantly different from zero). After adjusting for age and sex the earnings growth of trainees from two of the five ITOs were not significantly different from those of the comparison group on average.

Impacts on average earnings in the first year post training

The impact estimates in this study relate to impact of training on the change in the log of average earnings over the 1-year pre-training to the 1-year post-training period. Estimates of the impact of training on average annual earnings in the year after completing training were also calculated, based on change in the average earnings over the period.

Average earnings before training started varied markedly by sex, age and industry of employment. For example, annual earnings in the year before

training started were about 44,300 for men who gained level 2 qualifications and 48,400 for men who gained level 4 qualifications. The corresponding figures for women were 29,200 and 39,100 respectively. All earnings figure are expressed in March 2009 dollars.

Gaining a level 2 qualification improved the annual earnings of women by $800 in the year after completing training on average (from $32,100 to $32,900), a level 3 qualification improved earnings by $1,150 (from $38,000 to $39,150), a level 4 qualification improved earnings by $1,500 (from $43,500 to $45,000), and gaining a qualification at level 5 or higher improved earnings by $2,600 on average (from $55,500 to $58,100).

Gaining a level 2 qualification improved the annual earnings of men by $600 on average (from $47,600 to $48,200), a level 3 qualification improved earnings by $1,250 (from $54,700 to $55,900), a level 4 qualification improved earnings by $2,600 (from $54,300 to $56,900), and gaining a qualification at level 5 or higher improved earnings by $1,900 on average (from $80,300 to $82,200). Completing a limited credit programme improved the annual earnings by $570 on average (from $51,150 to $51,700).

The earning benefits associated with gaining level 4 qualifications varied considerably by age and the number of credits gained. As noted previously, younger trainees were much more likely to gain qualifications that required the completion of a greater number of credits.

Gaining a level 4 qualification improved the annual earnings of men aged 20-24 when they started training by $5,000 in the year after completing training on average (from $42,600 to $47,600), the earnings of men aged 25-34 improved by $2,200 (from $53,000 to $55,200), the earnings of men aged 35-44 improved by $1,700 (from $62,100 to $63,800), and the earnings of men aged 45 and over improved by $1,100 (from $62,800 to $63,900).

Gaining a level 4 qualification improved the annual earnings of women aged 20-24 by $2,500 on average (from $35,400 to $37,900), the earnings of women aged 25-34 by $1,200 (from $45,700 to $46,900), the earnings of women aged 35-44 by $1,700 (from $45,500 to $47,200), and earnings of women aged 45 and over by $800 (from $44,100 to $44,900).

Completing 240 or more credits improved the annual earnings of men by $5,000 in the year after completing training on average (from $48,300 to $53,400), and the earnings of women by $3,100 (from $32,000 to $35,100). Completing between 120 and 239 credits improved the earnings of men by $2,200 (from $49,300 to $51,500), and the earnings of women by $1,700 (from $38,200 to $39,900). Completing between 60 and 119 credits improved the earnings of men by $1,100 (from $58,900 to $60,000), and the earnings of women by $900 (from $45,300 to $46,200). Completing less than 60 credits improved the earnings of men by $1,400 (from $68,000 to $69,400), and the earnings of women by $3,200 (from $54,700 to $57,900).

3.5.4 Controlling for employment during the training period

In this study, individuals were considered to be participating in industry training in any month if they were both enrolled in industry training at any stage during that month and employed at any stage during the month. Our definition of the

training period permitted breaks in training or employment of up to 12 months. In contrast, comparison group were required only to be employed in the first month of the training period (where the training period was defined by the sample trainee to which they were matched).

The vast majority of trainees were employed in all months of the training period; 89.5 percent were employed in all months during the whole training period, and 95 percent were employed in at least 90 percent of months during the training period. On average, trainees were employed 98.5 percent of months.

In contrast, 81 percent of comparison group were employed in all months during the whole training period (that is, the period of the trainee to which they were matched) and 88 percent were employed in at least 90 percent of months during the training period. On average, they were employed 96 percent of months.

Comparison group members were much less likely to have worked continuously in the period when trainees were participating in training. This was the case for both men and women.

It seems likely that those who have been are continuously employed would be more likely to experience earnings growth than those who have had breaks in their employment. We used a regression model to examine the effect of employment intensity on earnings growth. We used the basic regression model described above and included an extra variable in the vector of individual characteristics *X* to denote the proportion of month employed during the training period.[18] The dependent variable for the regression is the same as that used previously. This modified regression specification enables us to evaluate the effect of gaining a qualification on earnings growth while controlling for the average difference between the study and comparison groups in employment intensity over the training period.

The results, given in the left-hand side of Table 8, indicate that this refinement to the basic model has a moderate impact for women and little impact for men. The impacts of gaining a qualification on earnings growth for women are somewhat less positive once we have adjusted for the average difference in employment intensity. For example, the estimate for women who completed level 2 qualifications decreased from 4.5 percent to 3.5 percent, the estimate for level 3 qualifications decreased from 6 percent to 4 percent, the estimate for level 4 qualifications decreased from 6.5 percent to 4 percent, and the estimate for level 5 and above qualifications decreased from 8 percent to 5 percent.

Overall, the impacts of training on the earnings growth of women are reduced by about one-third, if differences between the study and comparison groups in employment intensity over the training period are controlled for.

This result suggests that some of the earnings growth experienced by women as a result of industry training can be attributed to employment continuity rather than the other effects of training, such as on-the-job or off-the-job training or learning, but this is not substantially the case for men. Both industry trainees and employees who are not participating in structured training or learning can

[18] We also estimated the regression including the proportion of time squared, but this was not statistically significant for any level, and made little difference to the results.

improve their skills through work experience and improve their earnings as a result.

Table 8: Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained and sex, study population and matched comparison group

Qualification by sex	Control for spell employment					
	No			Yes		
	Est	SE	N	Est	SE	N
Limited credit programme						
Female	**0.022**	0.005	4,400	**0.014**	0.005	4,400
Male	**0.021**	0.004	3,510	**0.018**	0.004	3,510
Level 1						
Female	0.013	0.008	1,800	0.005	0.008	1,800
Male	**-0.032**	0.005	2,130	**-0.033**	0.005	2,130
Level 2						
Female	**0.045**	0.005	4,570	**0.035**	0.005	4,570
Male	**0.024**	0.004	5,520	**0.020**	0.004	5,520
Level 3						
Female	**0.059**	0.006	4,200	**0.041**	0.006	4,200
Male	**0.045**	0.003	5,810	**0.037**	0.003	5,810
Level 4						
Female	**0.065**	0.007	2,490	**0.041**	0.007	2,490
Male	**0.073**	0.004	6,440	**0.068**	0.004	6,440
Level 5+						
Female	**0.079**	0.016	350	**0.050**	0.016	350
Male	**0.033**	0.006	900	**0.030**	0.006	900
Did not complete a qualification or limited credit programme						
Female	**-0.010**	0.004	13,980	**-0.020**	0.004	13,980
Male	**-0.013**	0.002	26,920	**-0.019**	0.002	26,920

3.5.5 Additional results

In this section we present results on the impacts of training on earnings growth 3 years after completing training, including income from self-employment.

For those who began and completed an episode of industry training between January 2003 and December 2005 we were able to examine the impacts on wage and salary earnings and employment up to 3 years after the qualification was completed, and to include income from self-employment up to 3 years after the qualification was completed.

Variations in impacts over the study period

Trainees who began and completed an episode of industry training between January 2003 and December 2005 are identified, as are those who began and completed between January 2006 and December 2008.

A substantial minority of trainees take 2 years or longer to complete their training spell, so those who began and completed an episode of industry training between January 2003 and December 2005 or between January 2006 and

December 2008, are skewed towards those who trained for shorter periods. To examine the impact of this we compared the results for these two groups with those for the whole study population. Table 9 compares the estimated impacts of training on earning growth over the year before and after training for the three groups of trainees.

The number of trainees who completed training spells during 2003–2005 as a percentage of all those who completed spells during 2003–2008 is relatively small, for all qualification levels. For example, 29 percent of trainees who completed level 3 qualifications during 2003–2008 did so during 2003–2005, and only 22 percent of trainees who completed a level 1 or 4 qualification during 2003–2008 did so during 2003–2005.

Table 9: Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained, and sex, study population and matched comparison group

Highest qualification	Sex	Training spells 2003–2005			Training spells 2006–2008			Training spells 2003–2008		
		First year post-training								
		Est	SE	N	Est	SE	N	Est	SE	N
None	Female	-0.002	0.006	4,420	**-0.016**	0.005	4690	**-0.010**	0.004	13,980
	Male	**-0.017**	0.003	8,530	**-0.012**	0.003	8410	**-0.013**	0.002	26,920
LCP	Female	**0.022**	0.007	1,970	**0.022**	0.007	1760	**0.022**	0.005	4,400
	Male	**0.026**	0.006	1,100	**0.020**	0.005	1820	**0.021**	0.004	3,510
Level 1	Female	**-0.049**	0.013	490	0.010	0.008	960	0.013	0.008	1,800
	Male	0.012	0.011	410	**-0.017**	0.006	960	**-0.032**	0.005	2,130
Level 2	Female	**0.045**	0.010	1,150	**0.044**	0.006	2780	**0.045**	0.005	4,570
	Male	**0.020**	0.007	1,380	**0.021**	0.004	2900	**0.024**	0.004	5,520
Level 3	Female	**0.026**	0.010	1,250	**0.070**	0.007	1630	**0.059**	0.006	4,200
	Male	**0.045**	0.050	1,670	**0.042**	0.004	2090	**0.045**	0.003	5,810
Level 4	Female	**0.035**	0.015	580	**0.061**	0.008	780	**0.065**	0.007	2,490
	Male	**0.057**	0.006	1,410	**0.057**	0.004	1840	**0.073**	0.004	6,440
Level 5+	Female	**0.094**	0.024	120	0.027	0.024	80	**0.079**	0.016	350
	Male	**0.054**	0.012	140	**0.020**	0.007	450	**0.033**	0.006	900

Note: LCP = limited credit programme. Estimates in bold are statistically significant at the 5 percent level

The most noteworthy difference is that the results for women who gained a qualification at level 1, 3, or 4 were more positive for training spells completed during 2006–2008, and for all training spells completed during 2003–2008, than for spells completed during 2003–2005. Women who completed training spells during 2003–2005, and gained a qualification at level 3 or 4, experienced about 3 percent higher earnings growth on average compared to individuals in the comparison group, whereas women who completed training spells during 2003–2008 experienced about 6 percent higher earnings growth on average. Women who gained a level 1 qualification during 2003–2008 experienced similar earnings growth on average compared to individuals in the comparison group, while those who trained during 2003–2005 experienced 4 percent lower earnings growth on average.

Results for women who gained no qualifications, completed a limited credit programme, or gained a qualification at level 2 or 5 and above, were very similar over the 2003–2005 and 2003–2008 periods.

Results for men who gained a qualification at level 1 or 5 and above were less positive for training spells completed during 2003–2008 than for spells during 2003–2005. Men who gained a level 1 qualification experienced 3 percent lower earnings growth during 2003–2008, while those who completed a level 1 qualification during 2003–2005 experienced the similar earnings growth on average compared to the comparison group. Men who completed training spells during 2003–2008 experienced about 3 percent higher earnings growth on average, whereas men who completed training spells during 2003–2005 experienced about 5 percent higher earnings growth on average.

Results for men who gained no qualification, completed a limited credit programme, or gained a qualification at level 2, 3, or 4 were fairly similar over the different study periods.

Overall, there was some variation in results over the study period, with the results for women who gained a qualification at level 1, 3, or 4 more positive for training spells completed during 2006–2008 than for spells completed during 2003–2005. However, results for men who gained a qualification at level 3 or 4 were slightly less positive for training spells completed during 2006–2008 than for spells completed during 2003–2005.

Impact on earnings in the third year after completing training

It is possible that the impact of training (and gaining a qualification) on subsequent earnings may increase or decrease over time. We were able to examine this to some extent by considering those who began and completed an episode of training between January 2003 and December 2005. For these trainees we were able to examine the impacts of training on wage and salary earnings up to 4 years after the qualification was completed, and income from self-employment up to 3 years after the qualification was completed.

In the previous section we saw that there was some variation in results (in the year after training) over the study period, nevertheless we think it is useful to examine the extent to which earnings impacts changed for this group of trainees over the first to third year post-training.

Table 10 shows that in most cases the impacts of training on earnings were similar or slightly lower in the third year post-training for those who gained a qualification at levels 1–4 or completed a limited credit programme than in the first year. Relatively few trainees completed training spells and gained qualifications at level 5 or above during 2003–2005, but the results indicate that the impacts of training may have been greater in the third year than in first year after training.

The longer-run impacts could be investigated when more years of data are available in the Employment Outcomes of Tertiary Education (EOTE) data set.

Impact on earnings from wages and salary and self-employment

In the main results, we considered only income from wages and salary in the outcome measure. We focused on trainees who were employees at some stage during the training period[19] and who were employed for at least 6 of the 12 months in the year immediately before training started and the year afterwards.

The administrative data records the employment status of trainees when they enrol in a training programme, and less than 1 percent of trainees were classified as self-employed when they started their training programme. Table 10 shows that 10–20 percent of trainees received some income from self-employment during the 3 years before they started training, depending on qualification level. However, among those who received income for self-employment, the amounts earned were low compared with income from wages and salary on average. This suggests that some trainees in our study population were supplementing their income from wages and salary with income from self-employment.

[19] Our main study population did not include anyone who did not receive any earnings from wages and salaries during the training period.

Table 10: Estimated impact of gaining a qualification on the change in log earnings, by level of highest qualification gained and sex

	All training spells during 2003-2005											
	First year post-training						Third year post-training					
	Earnings from wages and salary			Earnings from wages and salary and self-employment			Earnings from wages and salary			Earnings from wages and salary and self-employment		
	1			2			3			4		
Level by sex	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**
Limited credit programme												
Female	**0.022**	0.007	1970	**0.021**	0.007	1980	-0.006	0.010	1780	-0.004	0.012	1800
Male	**0.026**	0.006	1100	**0.020**	0.008	1130	0.008	0.010	1010	**0.026**	0.012	1040
Level 1 certificate												
Female	**-0.049**	0.013	490	**-0.047**	0.014	500	-0.033	0.020	450	-0.009	0.022	450
Male	0.012	0.011	410	**0.027**	0.013	410	-0.015	0.015	380	-0.016	0.019	390
Level 2 certificate												
Female	**0.045**	0.010	1150	**0.060**	0.010	1170	0.023	0.016	1040	**0.036**	0.017	1080
Male	**0.020**	0.007	1380	0.017	0.009	1400	**0.036**	0.010	1250	**0.063**	0.013	1310
Level 3 certificate												
Female	**0.026**	0.010	1250	**0.038**	0.011	1260	0.017	0.014	1100	**0.030**	0.016	1130
Male	**0.045**	0.005	1670	**0.044**	0.010	1730	**0.033**	0.007	1560	**0.050**	0.010	1630
Level 4 certificate												
Female	**0.035**	0.015	580	0.034	0.019	600	0.041	0.022	520	**0.078**	0.027	550
Male	**0.057**	0.006	1410	**0.061**	0.009	1500	**0.042**	0.009	1290	**0.043**	0.013	1420
Level 5+ certificate												
Female	**0.094**	0.024	120	**0.130**	0.03	120	**0.172**	0.034	100	**0.223**	0.047	110
Male	**0.054**	0.012	140	**0.090**	0.017	140	**0.101**	0.017	130	**0.100**	0.042	140

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

About 10–15 percent of trainees received some income from self-employment during the year after they completed training, depending on qualification level or sex, only slightly higher than the proportion in the matched comparison group. (Industry trainees were actually slightly less likely to receive income from self-employment than those in the matched comparison group, and only slightly more likely to receive income from self-employment during the 3 years after completing training.)

Note that income from self-employment is recorded annually in the Linked Employer–Employee Database (LEED), whereas income from wages and salary is recorded monthly. We apportioned income from self-employment over the year, so we could estimate income from self-employment in the year after training. We also used this to derived total monthly earnings from both wages and salary and self-employment income.

In an attempt to include trainees who became self-employed during or after completing training, and to include income from self-employment for all trainees, we redefined the study population on the basis that trainees had to have received income from wages and salary or self-employment for at least 6 of the 12 months in the year immediately after they finished training. (The pre-training employment criteria were unchanged with trainees required to have received income from wages and salary in at least 6 of the 12 months in the year immediately before they started training.) Including income from self-employment in the post-training period increased the number of trainees in the study population very slightly. We also redefined the outcome measure to include income from self-employment in both the pre- and post-training periods.

Table 10 compares the results for the main study population and the (only slightly) modified population, both 1 year and 3 years after completing training. Column 1 contains our main results (impacts one year after completing training, based on earnings from wages and salary only, for the main study population.) Column 2 contains 1 year impacts based on earnings from wages and salary and self-employment. Column 3 contains 3-year impacts, based on earnings from wages and salary only, and, finally, column 4 contains 3-year impacts, based on earnings from wages and salary and self-employment.

Overall, the results suggest that including income from self-employment leads to slightly higher earnings impacts 3 years post-training for women who gained a qualification at level 2 or above, and men who gained a qualification at level 2 or 3. It made little difference for men and women who gained a qualification at level 1, or for men who gained a qualification at level 4 or above. These results are somewhat contrary to expectations.

If income from both wages and salary and self-employment is considered, men who gained a qualification at level 2 experienced similarly higher earnings growth 3 years after training as those who gained a qualification at level 3 or 4. In comparison, women who gained a qualification at level 4 experienced much higher earnings growth 3 years after training than those who gained a qualification at level 2 or 3.

Including income from self-employment in the first year after training had less effect. Impacts for women who completed a qualification at level 2 or 3 were slightly greater, but made little difference for women who gained a qualification at level 1 or 4, or for men who gained a qualification at any level.

Overall, the results suggest that including income from self-employment in the outcome measure resulted in somewhat larger 3-year impacts for women and men who gained a qualification at level 2 or above, but made little difference for men and women who gained a qualification at level 1 and men who gained a qualification at level 4 or above.

Impact of training on employment status

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. Participating in training and gaining new qualifications or additional skills may also improve trainees' future employment prospects.

This paper has focused on changes in earnings growth rather than changes in employment status for three main reasons:

- our concerns about the quality of EOTE-based employment rate estimates
- the possibility that post-training employment rate changes are often driven by individuals' choices rather than improvements in 'employability' due to training
- that participation in training is contingent on being employed.

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 training and subsequent changes in employment rates is also questionable. 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 trainees. By design, the adults in our main study population were employed for at least 6 months of the 12 months before the start of their reference training spell and at least 6 months in the 12 months after training. To explore the impact of training on employment rates, we dropped the requirement that trainees had to have some waged employment in the first year after completion and considered a slightly broader population of working adults who met the other selection criteria. The study population was enlarged from 83,030 individuals to 105,890 individuals when we relaxed the requirement for post-training employment.

Figure 3 in Appendix B shows employment rates before and after the training spell for this broader population of trainees and their matched comparison groups. These descriptive results suggest that those who completed qualifications experienced small positive employment effects post-training, and these effects persisted over time, with effects evident 3 years after completion. Women who gained a qualification at level 3 or above and men who gained a qualification at level 3 experienced the largest larger employment effects that were maintained in the 3 years after the qualification was completed.

Employment rates are consistently lower after the training spell than before it for both the trainees and non-trainees, but this is largely a consequence of the study design (involving selection on the basis of pre-training employment).

Employment estimates calculated for this broader study population are presented in Table 11. The dependent variable is the change in the employment status 12 months before starting training compared with that 12 months after completing training.

Overall, those who gained a qualification at level 2 or above were more likely to be employed one year post training than comparison group members. Those who gained level 2 qualifications were 2 percent more likely to be employed, those who gained level 3 qualifications were 5 percent more likely to be employed, those who gained level 4 qualifications were 2 percent more likely to be employed, and those who gained qualifications at level 5 and above were 3 percent more likely to be employed.

Women experienced larger employment effects than men across all qualification levels, with the exception of level 3 qualifications. The impacts of training on earnings varied for men by age in some cases. For example, only men aged 24–34 who gained level 4 qualifications experienced an increase in employment, while those in other age groups did not. Men in all groups benefited from level 3 qualifications.

However, trainees were much more likely to be employed *during* the training period than individuals in the comparison group. Thus, it seems possible that this could explain differences in post-training employment rates.

Participation in industry training was defined on the basis of both enrolment and employment status, so that by construction those participating in industry training were also employed. Our definition of the training period permitted breaks in training or employment of up to 12 months. By construction, trainees were employed in the first and last months of the training period. In contrast, comparison group were required to be employed only in the first month of the training period.

Comparison group samples were much less likely to have worked continuously in the period when trainees were participating in training, and this was the case for both men and women.[20]

[20] Nearly 90 percent of trainees were employed in all months of the training period, and on average trainees were employed 98.5 percent of months. In contrast, 81 percent of comparison group individuals were employed in all months during the whole training period (that is, of the trainee they were matched to), and on average they were employed 96 percent of months.

Table 11: Estimated impact of gaining a qualification on the change in employment rate, by level of highest qualification gained, age, and sex, study population and matched comparison group

Charac-teristic	Did not gain a qualification or complete an LCP			LCP			Level 1 certificate			Level 2 certificate			Level 3 certificate			Level 4 certificate			Level 5+ certificate		
	Est	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**
All	**-0.087**	0.002	57,540	**0.025**	0.004	8,880	0.009	0.006	4,490	**0.024**	0.003	11,510	**0.054**	0.003	11,210	**0.023**	0.004	10,510	**0.032**	0.008	1,370
Sex																					
Females	**-0.084**	0.003	20,040	**0.025**	0.005	4,950	**0.018**	0.008	2,030	**0.032**	0.006	5,240	**0.059**	0.006	4,740	**0.038**	0.007	2,870	**0.063**	0.017	390
Males	**-0.089**	0.002	37,490	**0.025**	0.006	3,930	0.002	0.008	2,450	**0.018**	0.005	6,270	**0.051**	0.004	6,470	**0.017**	0.004	7,640	**0.020**	0.009	980
Sex and age (years)																					
Female																					
20–24	**-0.091**	0.007	4,640	0.000	0.020	550	0.001	0.042	140	0.000	0.013	1,190	**0.052**	0.014	940	0.022	0.020	540	-	-	-
25–34	**-0.091**	0.006	5,710	**0.044**	0.014	930	0.010	0.023	380	**0.048**	0.013	1,250	**0.079**	0.012	1,430	**0.054**	0.014	890	**0.096**	0.041	110
35–44	**-0.074**	0.006	4,960	0.009	0.010	1,310	0.008	0.015	630	**0.028**	0.010	1,330	**0.044**	0.010	1,150	**0.025**	0.012	840	**0.058**	0.028	130
45–64	**-0.083**	0.006	4,740	**0.033**	0.007	2,160	**0.039**	0.011	890	**0.048**	0.008	1,470	**0.055**	0.009	1,220	**0.048**	0.012	600	**0.087**	0.022	130
Male																					
20–24	**-0.084**	0.005	8,780	**0.058**	0.020	550	0.037	0.021	360	0.013	0.012	1,380	**0.078**	0.014	1,010	0.011	0.010	2,130	-	-	-
25–34	**-0.094**	0.004	11,950	0.008	0.012	980	0.019	0.015	710	**0.026**	0.009	1,900	**0.055**	0.008	2,030	**0.037**	0.008	2,550	0.049	0.027	170
35–44	**-0.094**	0.004	9,350	**0.036**	0.010	980	-0.013	0.014	690	0.009	0.009	1,510	**0.037**	0.007	1,840	0.004	0.008	1,700	0.002	0.014	340
45–64	**-0.079**	0.004	7,420	0.016	0.009	1,430	-0.020	0.014	700	**0.020**	0.008	1,490	**0.045**	0.007	1,580	0.006	0.008	1,270	0.021	0.011	450

Notes: The dependant variable is change in employment status 12 months before training started and the 12 months after training ended. Estimates in bold are statistically significant at the 5 percent level. 'N' refers to the number of trainees in the study population. LCP = limited credit programme.

It seems likely that those who were employed for all or much of the training period would be more likely to remain employed afterwards than those who had breaks in their employment. To investigate this we used a regression model to examine the effect of employment intensity during the training spell on changes in employment status 12 months before and after training. We used the basic regression model described in section 3.5.1 and included an extra variable in the vector of individual characteristics *X* to denote the proportion of month employed during the training period.[21] The dependent variable for the regression is the same as that used previously. This modified regression specification enables us to evaluate the effect of gaining a qualification on the change in employment status, controlling for the average difference between the study and comparison groups in employment intensity over the training period.

This refinement to the basic model has a dramatic impact on the results for both women and men across all levels. The impacts of gaining a qualification on employment status disappear and those who completed qualifications were no more likely to be employed 1 year after completing training than those in the comparison group.

These results indicate that the short-term post-training employment impacts can be attributed to employment continuity during the training period, as distinct from structured teaching and learning. Some trainees were observed up to 3 years after they completed training, and for these trainees small positive employment effects were evident (after controlling for employment experience during the training period), suggesting there may be longer-term employment impacts associated with gaining new qualifications at levels 1–3 for men and levels 1–4 for women.

Women who gained a level 1 or 2 qualification were 1–2 percent more likely to be employed 3 years after completing training than comparison group members, and women who gained a level 3 or 4 qualification were 3–4 percent more likely to be employed. Men who gained a level 1 qualification were 5 percent more likely to be employed, while men who gained a level 2 or 3 qualification were 2 percent more likely to be employed 3 years after completing training.

Our results indicate that completing a qualification improved trainees employment prospects one year after completing training. However, we caution readers from assuming that these results provide a reliable indication of the employment 'return' to gaining a further qualification, as it seems this result is due to trainees being more likely to be employed during the training period than individuals in the comparison group. Therefore, it is not surprising that those who completed qualifications were also more likely to be employed 1 year after completing training, and it is this rather than (or perhaps in combination with) improvements in employability due to further training that are driving the result.

Among those trainees who were observed 3 years after they completed training, small positive employment effects were evident for many groups of trainees, after controlling for differences in work experience during the training period, suggesting there may be small longer-term employment impacts associated with gaining new qualifications through industry training.

[21] We also estimated the regression including the proportion of time squared, but this was not statistically significant for any level, and made little difference to the results.

3.5.6 Limitations

Several aspects of the research design could have affected our results, and we discuss these here.

Quality of matching

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

While we find earnings benefits for those who gained qualifications, it is possible that earnings might have increased more rapidly for trainees (relative to the comparable non-trainees) for reasons other than their participation in training. Various characteristics of the individual, the employer, and the job will influence employers' and individuals' decisions to participate in industry training. The incentives and potential rewards of participating in and completing training will also vary. In some cases, a particular job may require successful completion of a programme (for example, a health and safety or licensing requirement).

We were not able to match on many of the characteristics likely to influence individuals' and employers' decisions to participate in industry training. Hence, any comparison group of non-trainees constructed solely on the basis of characteristics observed in LEED has the potential to differ from the participant group in important ways. We cannot know the extent to which our estimates are affected by this limitation. However, it is reassuring that those who enrolled in, but did not complete, a qualification experienced earnings growth similar to that of the matched comparison group, on average.

The impact on gaining a level 4 qualification on earnings is much greater for those aged 20–24 when training started than for older age groups. If wage increases reflect productivity increases, then we might expect greater increases among younger trainees, as older trainees have already attained a certain level of competency, and industry training may be just be adding skills around the margin. Recognition of prior learning, a unique feature of industry training, means that employees gain formal recognition of skills they already possess. In some cases, employers will already be rewarding these skills, so there will be no impact on earnings. In other cases, formal recognition of skills may result in trainees experiencing an increase in earnings.

For some groups (men and women who gained a level 2 qualification, and women who gained a level 3 qualification), average earnings increased slightly during the 6 months *before* training started and it could be that employers are selecting 'better' employees to train and/or that employers are rewarding employees for participating in training before training even starts. This could occur if employers find recruiting suitably skilled or trained workers difficult, so they hire new employees who require training, but remunerate them as if they were trained already, and in cases where an employee is an established worker who requires further training.

Alternatively, we may have underestimated the beneficial impact of gaining a qualification. For example, if the trainees in the study population were, on average, less skilled than the employees in the comparison group, it is possible

they would have had lower earnings growth without the further education, leading to an underestimate of 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 trainees were not matched with non-trainees 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.

Crichton and Dixon (2010) explored this issue through an analysis of data from the Survey of Family, Income and Employment (SoFIE) in which they matched the study population and comparison group on prior educational attainment as well as prior level of earnings. The study population comprised those who gained a tertiary qualification during 2004–2007. It is not possible to tell which qualifications were obtained through industry training programmes and which were obtained at tertiary institutions, as this information is not collected, and the study population contains both groups.[22]

Crichton and Dixon concluded that including information on workers' prior level of educational attainment in the impact models (so that students were being compared with similarly qualified non-students) did not alter the estimates of the impact of gaining a level 1–3 qualification, and slightly lowered estimates of the impact of gaining a level 4–6 qualification. Hence, omission of prior education from the case-matching probably did not lead to a substantial underestimation of the average benefits of further study.

One interesting finding from the study was that employees aged 25 and over who complete a level 1–3 qualification were more highly educated than is often assumed. 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.

Information on prior educational attainment is recorded in the administrative data for about two-thirds of industry trainees. This suggests that about half of the trainees aged 20–64 who completed qualifications at levels 1–3 were unqualified or had only a lower school qualification before they began. About two-thirds of the adults who completed a qualification at level 4 were unqualified or had only a school qualification before they began. This suggests that a majority of trainees did increase their level of educational attainment as a result of gaining the new qualification.

While the omission of education from the EOTE-based analysis probably did not lead to any substantial underestimation of the benefits, not having a measure of prior educational attainment for non-trainees 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

[22] The administrative data show that during 2004–2007, 40 percent of level 1–3 qualifications, 40 percent of level 4 qualifications, and 8 percent of level 5–6 qualifications gained by those aged 25–64 (excluding those requiring less than 3 months of study to complete) were gained through industry training rather than tertiary education providers. The proportion of level 1–4 qualifications that were gained through industry training increased from 26 percent in 2003 to 46 percent in 2008.

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 trainees without prior academic qualifications or trainees with lower than average academic ability (Dearden et al, 2000; Jenkins et al, 2002).[23]

We did not include location or tenure in our matching algorithm. To address this potential weakness we included regression controls for location (74 territorial local authorities), tenure in the month the training started, and employment experience during the 36 months before training started.

Adding these additional controls changed the estimated impact of gaining a qualification at level 2 or above by less than 0.4 percentage points. For example, the impact of level 4 qualifications on relative earnings decreased slightly from 7.1 percent to 6.8 percent, but increased slightly for qualifications at level 5 or above, from 4.6 percent to 5.0 percent.

The only material difference was for qualifications at level 1 where the estimated impact increased from -1.1 percent to 0.5 percent, and was no longer statistically significant. Impacts increased for men from -3.2 percent to -1.3 percent, and for women from 1.3 percent to 2.7 percent, both results were statistically different from zero.

Relying on total monthly earnings

This study used changes in monthly earnings, rather than changes in hourly earnings, as this is all that is available in the EOTE data. This is a potentially significant limitation of this study, given that changes in monthly earnings are affected by changes in hours of work as well as changes in wage rates.

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.

Crichton and Dixon (2010), looked at this issue in the context of an analysis of returns to further education and training using data from the Survey of Families, Incomes and Employment, and found that women who completed a qualification at level 4 or above 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 analysis would lead to an overstatement of the benefits of training.

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

[23] Dearden et al (2000) found that certain vocational qualifications seem to have a higher pay off for lower-ability individuals than higher-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.

changes in this variable can be totally driven by changes in hours worked, so it does not always give a useful indication of underlying changes in wages.

3.5.7 Comparison with results from the previous study of returns to industry training

The results from this study are not particularly consistent with findings from the earlier study of industry training undertaken during 2002–2005 (Crichton, 2009).

The previous study found no significant earnings benefits for women aged 20–64 who gained a level 2 or 3 qualification, whereas this study (which includes all training spells during 2003–2008) found earning benefits of 4.5 percent and 6 percent. The previous study found only small earnings benefits for women who gained a level 4 qualification of about 2 percent, whereas this study found much greater earning benefits of 6.5 percent. Results for men were more similar, although the previous study found no significant earnings benefits for men who gained a level 2 qualification, but this study found small but significant earnings benefits. The previous study found only small earnings benefits for men who gained a level 3 qualification of about 2 percent, whereas this study found larger earning benefits of 4.5 percent.

The differences in the results partly reflect changes in methodology, the main change being that this study focused on the impacts of training 1 year rather than approximately 3 years after completing training.[24] (This change was made so that returns to qualifications gained up to the end of 2008 could be examined.) The study population is also considerably larger, and as a result estimates are more precise and small impacts are more likely to be statistically significant.

Comparing impacts 1 year and 3 years after completing training, shows that impacts were similar or declined slightly. For example, women who gained a level 2 or 3 qualification in 2003–2005 experienced earning benefits of 2.5 percent and 4.5 percent in the year post-training, but these decreased to 2 percent and were no longer statistically significant in the third year after completing training. Similarly, men who gained a level 3 qualification experienced earning benefits of 4.5 percent in the year post-training, but this decreased to 3 percent in the third year, more similar to the 2 percent obtained in the previous study.

The difference in results also reflects that qualifications at levels 3 and 4 gained by women in 2006–2008 had larger positive impacts 1-year post-training, on average, than those gained in 2003–2005. It is unknown whether these impacts will decrease over time. (They did for women who gained a level 2 or 3 qualification in 2003–2005, but not for women who gained a level 4 qualification.)

[24] The current study examines impacts in both the first and third year post-training, while the previous study focused on impacts 4 years after training *started.* The training period for those who gained a level 2 or 3 qualification was about 12–18 months, so impacts 4 years after training started correspond approximately to those during the third year post-training.

3.5.8 Comparison with results on the returns to qualifications gained through tertiary institutions

Some results from this study can be directly compared to results from the study on returns to qualifications gained through tertiary institutions (Crichton and Dixon, 2010).

The earlier study examines returns 3 years after completing study, for those aged 25–64 who gained level 1–6 qualifications. The current study examines the returns to level 1–6 qualifications gained through industry training. Table 12 compares the results from the two studies for those aged 25–64, over the same period.

Table 12: Estimated impact of gaining a qualification on the change in log earnings by the third year post study or training, by level of highest qualification gained, sex, and provider (all those aged 25–64 when they started training or studying)

	All training or study spells during 2003–2005					
	Industry training			Tertiary institutions		
Level by sex	**Est**	**SE**	**N**	**Est**	**SE**	**N**
Level 1						
Total	-0.023	0.014	750	-	-	-
Female	-0.036	0.021	430	-	-	-
Male	-0.005	0.015	310	-	-	-
Level 2						
Total	**0.032**	0.008	1,760	-	-	-
Female	**0.039**	0.016	760	-	-	-
Male	**0.028**	0.009	1,000	-	-	-
Level 3						
Total	**0.032**	0.007	2,260	-	-	-
Female	**0.027**	0.015	910	-	-	-
Male	**0.037**	0.007	1,360	-	-	-
Levels 1–3						
Total	**0.024**	**0.005**	4,770	**-0.020**	0.007	6,020
Female	0.019	**0.010**	2,100	-0.005	0.009	3,660
Male	**0.029**	**0.005**	2,670	**-0.042**	0.008	2,360
Level 4						
Total	**0.039**	0.009	1,500	-0.009	0.008	3,650
Female	**0.055**	0.023	430	-0.003	0.012	2,250
Male	**0.032**	0.009	1,060	**-0.018**	0.009	1,400
Level 5+						
Total	**0.129**	0.018	230	0.019	0.012	1,790
Female	**0.170**	0.034	100	**0.068**	0.018	1,070
Male	**0.097**	0.018	130	**-0.059**	0.015	720

Notes: The dependant variable is change in log average monthly earnings over the 12 months before training started and the 25–36 months after training ended. Qualifications at levels 1–3 gained through tertiary institutions cannot be distinguished. Estimates in bold are statistically significant at the 5 percent level. 'N' refers to the number of trainees in the study population.

Those who gained level 1–4 qualifications through tertiary institutions experienced no significant earning benefits. In comparison, men and women who gained level 2–4 qualifications through industry training experienced earning benefits of 2.7–5.5 percent, while those who gained a level 1 qualification experienced no earning benefits on average.

Women who gained a level 5 or 6 qualification through tertiary institutions experienced earnings benefits of 7 percent, while men experienced an earnings penalty. In comparison, women and men who gained a level 5 or 6 qualification through industry training experienced earning benefits of 17 percent and 10 percent respectively.[25]

The findings suggest qualifications gained by 25–64-year-olds through industry training were associated with more widespread, though modestly sized, earnings benefits than qualifications gained through tertiary institutions over the same period.

3.6 Summary and discussion

This study has examined the impact of industry training on the earnings of 20–64-year-old employees who completed an episode of training during 2003–2008. The main finding is that most groups of trainees who completed a qualification experienced greater earnings growth over the one-year pre-training to post-training period, compared with the earnings growth of a matched comparison group of working adults who did not participate in training. Gains generally increased as the level of the qualification increased, but there was considerable variation in impact by field of study and to a lesser extent by age and sex.

Level 2 qualifications were associated with a 3 percent increase in earnings growth on average, level 3 qualifications with a 5 percent increase, level 4 qualifications with a 7 percent increase, level 5 and above qualifications with a 5 percent increase, and limited credit programmes with a 2 percent increase in earnings growth. Those who did not complete a qualification or those who gained a level 1 qualification did not experience any earning benefits.

New qualifications at level 2 and above were associated with earnings benefits for women and men, and all age groups. Those who gained qualifications in some fields experienced large gains in their earnings on average, while those in other fields experienced no significant improvement.

Some trainees were observed up to 3 years after they completed training. The earnings benefits associated with training were similar, or declined slightly, over the 3 years. Including income from self-employment in the measure of earnings resulted in some small additional benefits 3 years afterwards for some groups of trainees, particularly those at level 3.

3.6.1 Study population

Approximately 60 percent of trainees in our study population were male, and about 20 percent were aged 20–24, 30 percent were aged 25–34, one-quarter aged 35–44, and the remaining one-quarter aged 45–64.

Our study population included only those who were employed for at least 6 months during the year before they started training and the year after they finished training. About 40 percent of these trainees gained a qualification; 5 percent gained a qualification at level 1, 12 percent at level 2, 12 percent at

[25] Only about 220 industry trainees gained qualifications at level 5 or above over this period and impacts are imprecisely estimated.

level 3, 11 percent at level 4, and 1.5 percent at level 5 or above. A further 10 percent completed a limited credit programme, and the remaining 50 percent did not gain a qualification or complete a limited credit programme.

The median duration of training was 9 months for those who gained a level 1 or 2 qualification, 15 months for a level 3 qualification, 21 months for a level 4 qualification, and 18 months for a qualification at level 5 or above. The median number of credits achieved by trainees who gained a level 1 or 2 qualification was about 50, level 3 about 70, level 4 about 130, and level 5 and above 145.

Most of the trainees in our study population were working in waged or salaried jobs on a continuous or close to continuous basis before they started training. This is partly a consequence of the study design, which required a trainee to be employed for at least 6 of the 12 months in the year before they started training. On average trainees had worked for an average of 11–12 months of the year before they started training, and for 32–34 months of the 3 years before they started training. Those who gained qualifications at higher levels were more likely to have been continuously employed before they started training. Average monthly earnings in the pre-training year ranged from $2,540 for women who gained qualifications at level 1 to $6,425 for men who gained qualifications at level 5 or above (expressed in March 2009 dollar values).

3.6.2 Methods

To estimate the impact of gaining a qualification, we compared the earnings changes experienced by the trainees over the pre-training to post-training period with the changes experienced by a matched comparison group of working adults who did not participate in industry training over the same period. We analysed the difference in earnings that was apparent by the first and third years after the trainees completed their qualifications.[26]

3.6.3 Variation in impacts

As noted above, those who completed a qualification at level 2 or above increased their earnings growth relative to the comparison group on average, and gains generally increased as the level of qualification increased. In the case of level 2 and 4 qualifications, those who gained more credits experienced greater benefits. Gaining new qualifications at level 2 and above was associated with earnings benefits for women and men, and all age groups, on average.

Those who gained qualifications in some fields experienced gains in their earnings on average, while those in other fields experienced no significant improvement. For example, those who gained a level 4 qualification in engineering and related technologies or agriculture and environment experienced significant earnings benefits, while trainees in society and culture experienced no significant earnings benefits. The impact of training also varied substantially by the ITO administering the training across all qualification levels.[27]

[26] 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.

[27] Confidentiality requirements mean we cannot report results for individual ITOs.

Several factors could be contributing to these field of study and ITO variations, including:

- differences in qualification requirements (that is, some industries have a longstanding emphasis on formal qualifications while other industry have only recently developed training programmes)
- the effects of industry wage differentials on trainees' earnings
- the effects of differences in the unmeasured characteristics of trainees and non-trainees were not controlled for in the analysis.

Some occupations have a well-defined training pathway, closely linked to remuneration, while in other occupations and industries this is not the case. The incentives and potential rewards of participating in and completing training also vary substantially across industries. Much of the variation in impacts by field of study and ITO that we observed will likely reflect these factors.

Our main results are based on earnings during the first year after the qualification was completed, with some additional results based on earnings in the third year after the qualification was completed. 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 and training on earnings may take longer than 3 years to become fully apparent. Our results suggest that returns for some qualification levels had increased for some groups of trainees 3 years later, only if income from self-employment was included. If earnings from wages and salary alone are considered, there is no evidence that returns improved 1–3 years after completing training for qualification below level 5.

The earnings benefits associated with gaining lower level qualifications were relatively small and several factors may have contributed to this. Firstly, trainees at this level studied for relatively short periods, 6–12 months on average, and short spells of training are probably less likely to raise earnings than longer ones because the impact on knowledge and skills is also likely to be more limited. Secondly, about one-third of trainees aged 20–64 who gained a qualification at level 1 or 2 were already qualified at an equivalent or higher level, and this seem to reduce the likelihood that they will gain labour market rewards as a result.

3.6.4 Employment impacts

This study focuses on earnings impacts rather than employment impacts, mainly because participation in training required trainees to be employed. While trainees were more likely to be employed one year after completing training, this was entirely explained by their greater levels of employment during the training period. (Higher levels of employment among the study population during the training period also explains about one-third of the earnings impact for women, but very little for men. For example, women who gained a qualification at level 3 or 4 had 6 percent higher earnings on average, but if differences in employment during the training period are taken into account, this decreases to 4 percent.)

Some trainees were observed up to 3 years after they completed training, and for these trainees', small positive employment effects were evident (after controlling for employment experience during the training period), suggesting

there may be small longer-term employment impacts associated with gaining new qualifications for at level 1–3 for men and level 1–4 for women.

Industry training may be acting to keep trainees in employment, or it could be a consequence of the characteristics of employers and/or employees who decide to undertake training, whereby people in jobs that they (or their employer) expect to last longer are more inclined to train.

3.6.5 Limitations

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

While we found widespread earnings benefits for those who gained qualifications, it is possible that earnings might have increased more rapidly for trainees (relative to the comparable non-participants) for reasons other than their participation in training. Various characteristics of the individual, the employer, and the job influence employers' and individuals' decisions to participate in industry training. The incentives and potential rewards of participating in and completing training also vary. In some cases, a particular job may require the successful completion of a programme (for example, it could be a health and safety or licensing requirement). Conversely, the impacts of training may also be underestimated (for example, if the trainees 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).

We were not able to match on many of the characteristics likely to influences individuals' and employers' decisions to participate in industry training. Hence, any comparison group of non-participants constructed solely on the basis of characteristics observed in LEED has the potential to differ from the participant group in important ways. We cannot know the extent to which our estimates are affected by this limitation. It is reassuring that those who enrolled in, but did not complete, a qualification experienced earnings growth similar to that of the matched comparison group, on average.

Another potential limitation is that this study used changes in monthly earnings, rather than changes in hourly earnings, as this is all that is available in the EOTE data set. This is a potentially significant limitation given that changes in monthly earnings are affected by changes in hours of work as well as changes in wage rates.

3.6.6 Comparison with results from previous studies

The results from this study are not particularly consistent with findings from the earlier study on the earnings benefits of industry training undertaken during 2002–2005 (Crichton, 2009).

The previous study found no significant earnings benefits for women who gained a level 2 or 3 qualification, whereas this study (which includes all training spells during 2003–2008) found earning benefits of 4.5 percent and 6 percent. The previous study found only small earnings benefits for women who gained a

level 4 qualification of about 2 percent, whereas this study found earning benefits of 6.5 percent.

The differences in the results partly reflect changes in methodology, the main change being that this study focused on the impacts of training 1 year rather than approximately 3 years after completing training.[28] (This change was made so that returns to qualifications gained up to the end of 2008 could be examined.) The study population is also considerably larger, and as a result estimates are more precise and small impacts are more likely to be statistically significant.

Comparing impacts 1 year and 3 years after completing training, shows that impacts were similar or declined slightly. For example, women who gained a level 2 to 3 qualification in 2003–2005 experienced earning benefits of 2.5 percent and 4.5 percent in the year post-training, but these decreased to 2 percent and were no longer statistically significant in the third year after completion of training. Similarly, men who gained a level 3 qualification experienced earning benefits of 4.5 percent in the year post-training, but this decreased to 3 percent in the third year, more similar to the 2 percent obtained in the previous study.

The difference in results also reflects that qualifications at levels 3 and 4 gained by women in 2006–2008 had larger positive impacts 1-year post-training, on average, than those gained in 2003–2005. It is unknown whether these impacts will decrease over time. (They did for women who gained a level 2 or 3 qualification in 2003–2005, but not for women who gained a level 4 qualification.)

Research on the returns to level 1–6 qualifications gained through tertiary institutions found no or only small benefits for 25–64-year-olds who gained qualifications at levels 1–4. Our findings suggest qualification gained through industry training generated more widespread earnings benefits.

[28] The current study examines impacts in both the first and third year post-training, while the previous study focused on impacts 4 years after training *started.* The training period for those who gained level 2 or 3 qualifications was about 12–18 months, so impacts 4 years after training started correspond approximately to those during the third year post-training.

4 CONCLUSION

This study has examined the impact of industry training on the earnings of 20–64-year-old employees who completed an episode of training during 2003–2008. The main finding is that most trainees who completed a qualification improved their earnings over the 1-year pre-training to the 1-year post-training period compared with the earnings of a matched comparison group of working adults who did not participate in training. Gains generally increased as the level of qualification increased, but there was considerable variation in impacts by field of study and to a lesser extent by age and sex.

Level 2 qualifications were associated with a 3 percent increase in earnings growth on average, level 3 qualifications with a 5 percent increase, level 4 qualifications with a 7 percent increase, and limited credit programmes with a 2 percent increase in earnings growth. New qualifications at level 2 and above were associated with earnings benefits for women and men, and all age groups. In the case of level 4 qualifications, those who completed more than 240 credits experienced greater benefits. Within a given qualification level, those who completed qualifications in some fields experienced relatively large earnings benefits on average, while those in other fields experienced no benefit.

Several factors could be contributing to these field of study variations, including:

- differences in qualification requirements across industries (that is, some industries have a longstanding emphasis on formal qualifications while other industries have only recently developed training programmes)
- the effects of industry wage differentials on trainees' earnings
- the effects of differences in the unmeasured characteristics of trainees and non-trainees that were not controlled for in the analysis.

This study focused on earnings impacts rather than employment impacts because participation in training required trainees to be employed. While trainees were more likely to be employed 1 year after completing training, this was entirely explained by their greater levels of employment during the training period. Some trainees were observed up to 3 years after they completed training, and for these trainees small positive employment effects were evident (after controlling for employment experience during the training period), suggesting there may be small longer-term employment impacts associated with gaining new qualifications at levels 1–3 for men and levels 1–4 for women.

A critical issue for the validity of the results is whether the trainees in the study population were matched appropriately with comparable non-trainees, and would have shared the same earnings growth path if they had not undertaken further training. Various characteristics of the individual, the employer, and the job will influence employers' and individuals' decisions to participate and complete industry training. We cannot know the extent to which our estimates are affected by this limitation. However, those who enrolled in, but did not complete, a qualification experienced no earnings benefits over the pre-training to post-training period, when compared with the earnings of a matched comparison group.

The results from this study are not particularly consistent with findings from the earlier study on the earnings benefits of industry training undertaken during 2002–2005 (Crichton, 2009). The previous study found no significant earnings benefits for women who gained a level 2 or 3 qualification, whereas this study (which includes all training spells during 2003–2008) found earnings benefits of around 5 percent. The previous study found only small earnings benefits for women who gained a level 4 qualification of about 2 percent, whereas this study found earnings benefits of about 6 percent. The differences in the results partly reflect that this study focuses on the impacts of training 1 year rather than approximately 3 years after the completion of training, but also that the 1-year impacts for women who gained a qualification at level 3 or 4 were more positive for training spells completed during 2006–2008, than for spells completed during 2003–2005.

Research on the returns to level 1–6 qualifications gained through tertiary institutions by 25–64-year-olds (Crichton and Dixon, 2010) found that only women who gained level 5–6 qualifications experienced earnings benefits 3 years later. Men who gained qualifications at levels 1–6 and women who gained qualifications at levels 1–4 experienced no earning benefits 3 years later. These findings suggest qualifications gained by 25–64-year-olds through industry training were associated with more widespread earnings benefits than qualifications gained through tertiary institutions over the same period.

APPENDIX A: INDUSTRY TRAINING DATA

Industry training is formalised learning that occurs within the workplace. It provides employees with training and learning that is linked to national qualifications through the New Zealand Qualifications Framework (NQF).

The Industry Training Act 1992 provided the framework for industry to control the development, implementation, and management of industry training programmes. Industry training organisations (ITOs) were created to identify and respond to the skill needs of their industry, develop skill standards and training programmes, and arrange for the delivery and assessment of workplace-based learning.

The Modern Apprenticeship programme operates under the Modern Apprenticeship Training Act 2000. Modern Apprenticeships are similar to industry training, but they are mainly for trainees aged 16–21. Modern Apprenticeship coordinators support the apprentices. They help to manage training arrangements in conjunction with the employer and the ITO.

Trainees participating in industry training undertake on-the-job and/or off-the-job learning that leads to a standards-based national qualification on the NQF. Training and assessment for NQF standards can occur in both modes of learning. Workplaces themselves may have dedicated training staff and materials that, along with an ITO-registered workplace assessor, can provide both on-the-job learning and assessment of a trainee's skills against the prescribed competencies required for NQF standards. Off-the-job learning and assessment usually occurs at an accredited training provider such as a private training establishment or an institute of technology and polytechnic that the ITO contracts to deliver relevant training and assessment.

Participants in industry training sign a training plan (or training agreement) with their employer and the relevant ITO at the beginning of their involvement in industry training. The training agreement includes details of the trainee's training programme/s and the obligations of the employer and trainee to fulfil the training programme/s.

The training agreement details the involvement of the ITO in training and assessment, national qualification/s the trainee will be undertaking, standards and credits that make up the qualification, the overall duration of the programme, and the minimum number of credits to be achieved by the trainee each year.

The Tertiary Education Commission administers government funding of industry training. It receives information from ITOs for the purposes of funding and monitoring training provision. The commission does not collect details of individual training agreements, so cannot determine their content or measure progress towards the accomplishment of learning goals set out in agreements. However, the administrative data records various aspects of each programme the trainee undertakes (including the programme start and end dates, type, expected duration, and the number of credits to be achieved). The administrative data also captures the number of credits and qualifications achieved at each level, in each programme, in each year. A training agreement

may cover more than one training programme, and a training programme, while usually based on one qualification, may result in a trainee gaining more than one qualification.

A trainee will embark on one or more programmes as part of their training agreement. These may be undertaken concurrently or sequentially and there may be breaks in enrolment. A training programme consists of either a full NQF qualification[29] or a subset of a qualification called a 'limited credit programme'. The successful completion of a limited credit programme (typically between 20 and 40 credits) does not result in the achievement of a national qualification.[30]

Limited credit programmes enable employees to undertake formal learning on industry-specific standards, and can provide a pathway into formal learning for employees with low-level or no qualifications. Limited credit programmes are also used by employers to comply with health and safety regulations.

Industry training programmes (through the qualification associated with them) are assigned a level from 1 to 7. Levels 1–3 are equivalent to upper secondary (years 11–13, respectively). Level 4 is higher than upper secondary, and is often associated with trades training. Many certificates and diplomas are levels 5 and 6.

Of those trainees who began and ended an episode of industry training during 2003–2005, 34 percent were undertaking programmes at level 4, 35 percent at level 3, 25 percent at level 2, 5 percent at level 1, and 1 percent at levels 5 and 6.[31]

Those who gained a level 4 qualification typically achieved 120–240 credits (120 credits are roughly equivalent of one academic year of full-time study). Those who gained a level 3 qualification typically achieved 60–120 credits, and those who gained a level 1 or 2 qualification typically achieved 40–60 credits.

The proposed duration of training varied between 6 and 48 months and was related to the type and level of programme, as well as the intensity of training. Even among those who completed their training programmes, the proposed duration was often quite different from actual duration. The proposed number of credits for a trainee to achieve each year (referred to as the 'training load') also varied considerably. In some cases, recognition of prior learning, which is not always recorded in the data, may explain this.

The Tertiary Education Commission, the Industry Training Federation, and Mahoney (2009) are all good sources of information on industry training.

Industry training data

The Tertiary Education Commission receives information on trainees in industry training for the purposes of funding and monitoring training provision. The data

[29] Qualifications include national certificates and national diplomas.

[30] Of those who ended a period of training during 2003–2005, around 11 percent were undertaking a limited credit programme. These trainees did not undertake further training for at least 12 months, but they may have undertaken further training after that.

[31] Note that the 39 ITOs varied considerably with respect to the numbers of trainees enrolled, the type and level of programmes undertaken, and the achievement of trainees in these programmes. For example, many ITOs do not offer limited credit programmes.

is collected from ITOs on a quarterly basis. The data is summarised further to produce annual data, which we used in our analysis. The data is consistent with that used by the Tertiary Education Commission to produce information on participation and achievement in Industry Training..

The data used in our analysis covered 2001–2009 and included information about all those who participated in training in a given year. The data is structured around programme enrolments (whereby a trainee can be enrolled in more than one programme and with more than one ITO in any given year).

The data set included demographic information and other characteristics of the trainee, as well as information on the training programmes they were undertaking. Demographic variables included age, sex, region, ethnicity, and highest previous qualification. Information on the training programme included start and end dates, the ITO overseeing the training, programme type and level, the expected duration of training, the total number of credits to be achieved, and the actual number of credits and qualifications achieved by level.

The wide variety of processes used by the 39 ITOs to collect and submit the data to the Tertiary Education Commission means there is potential for data to be of variable quality and consistency. The Ministry of Education (Mahoney, 2009) concluded that the data was robust enough for analytical purposes, and that the variables relating to credit and national qualification attainment were useful indicators of progression through learning and achievement.

The 'exit code' variable indicates whether the programme was successfully completed or not (and takes the values completed, terminated, or missing). It has known data quality issues, for example, atthe programme level, exit code is not recorded for the last enrolment record for around 13 percent of cases.

Trainees may enrol in a number of programmes in pursuit of the learning outcomes set out in their training agreement. They may be enrolled in more than one programme at any given time, or they may enrol in a series of programmes. In addition, when a programme changes in specification, the Tertiary Education Commission reassigns a new programme number, which is recorded in the trainee's record as a new enrolment in a new programme. The frequency of this practice is unknown, but in such cases, exit code is generally not populated. This adds a level of complexity to determining completion status based on the exit code variable.

The majority of trainees are enrolled in only one programme over a training period.[32] However, a substantial minority enrol in more than one programme. Among trainees who exited industry training in 2005, 72 percent had been enrolled in one programme over the training period, 18 percent in two, 8 percent in three or four, and 1 percent in five or more programmes.

Our analysis was based on a period of training undertaken by a trainee, which may involve participation in several programmes and the achievement of more than one qualification. We identified when a trainee began and ended a period of industry training, and permitted breaks of up to 12 calendar months.

[32] The definition of training period that we used ignores breaks in training of 12 calendar months or less.

We identified the last programme enrolment during the training period, and selected this as the reference programme. If more than one programme ended at the end of the training period, then we selected the one that corresponded to the highest qualification gained. If two or more programmes led to the same highest qualification (which could be none), we selected the one with the highest number of credits achieved. We used the reference programme to characterise the completion status associated with the training period. At the 'trainee training period' level, exit code is missing for the last programme record in 5 percent of cases. The missing rate varies quite substantially by ITO, with exit code missing in as few as 1 percent and as many as 40 percent of cases.

Comparing exit code with the numbers of credits and qualifications achieved over the total training period suggests that not all credits or certificates may be being recorded. For example, those who completed a limited credit programme would be expected to have achieved at least 20 credits. However, 7 percent had no credits recorded and a further 6 percent had fewer than 20 credits recorded. Similarly, those who complete a national certificate programme would be expected to have at achieved at least 40 credits and a certificate. However, 1 percent had no certificate recorded, 7 percent had a certificate recorded but no credits recorded, and a further 6 percent had a certificate recorded, but fewer than 40 credits recorded. Some of these discrepancies may be due to credits awarded by transfer (from another qualification) or recognition of prior learning that is not captured.

Our analysis focused on the highest qualification gained by the trainee during the training period, not on the completion status associated with a particular programme.

Linked Employer–Employee Database

Statistics New Zealand's Linked Employer–Employee Database (LEED) uses information from tax and statistical sources to construct a record of paid jobs. Since April 1999, all employers in New Zealand are required to file a monthly record with Inland Revenue (IRD) called an employer monthly schedule (EMS), which lists all paid employees at that firm during the month, the earnings they received, and the amount of tax that was deducted at source. Two types of recipients are covered by an EMS: those who have Pay-As-You-Earn (PAYE) tax deducted, who are employees; and those who pay withholding tax, who are a subset of the self-employed. Because the selection and coverage of which self-employed workers have tax withheld is unknown, we used only information on PAYE-deducted (employee) jobs.[33] We used all the available data on PAYE employee jobs in New Zealand during the nine March years from April 1999 to March 2008.

[33] In addition to regular firm–worker employment jobs being identified in LEED, several other relationships involving PAYE tax deductions can also be identified by particular employer identifiers. These identifiers are working-age social welfare taxable benefits, earnings-related accident compensation payments from the Accident Compensation Corporation, student allowance payments, paid parental leave payments, and New Zealand Superannuation retirement pensions. In what follows, we make a distinction between LEED earnings from employment-jobs and other LEED income from these other (non-employment) sources.

Firms (employers) and workers (employees) are identified by unique confidentialised identifiers based on their respective IRD tax numbers. For workers, this represents a single identifier over time, enabling workers to be tracked longitudinally and across the firms they work for. In the IRD data, employers are identified as the legal or administrative unit to which the EMS return relates, and do not equate to any consistent conception of a firm. That is, legal and/or other administrative changes can trigger a change in an employer's IRD identifier, with no effective change in the economic structure of the firm. Statistics New Zealand has used a range of administrative data to identify continuing enterprises even when IRD identifiers change. We use 'continuing enterprises', as defined in the Longitudinal Business Frame (Seyb, 2003) as our definition of firms.

Conceptually, the LEED covers the universe of PAYE employment relationships and earnings in New Zealand over the period. In addition, there is limited information on the characteristics of workers and firms: age, sex, and location of workers; and industry and location of firms. A number of issues with the LEED data affect our analysis to varying extents.

- Around 2 percent of all employee job records have missing or incorrectly coded IRD numbers. Where this occurs, individuals will appear not to be employed. This affects individual's employment history, creating false transitions between employment and non-employment.
- The presence of administrative churn in employer IRD numbers[34] means that employer changes are overstated, leading to some artificial worker turnover.
- LEED is structured around geographic units, with enterprises comprising one or more geographic units. Employees are linked to a single geographic unit. In cases where the enterprises comprise more than one geographic unit, employees are assigned to a geographic unit based on location (the unit the employee resides closest to) with further adjustments made to ensure the distribution of employees across geographic units is consistent with that reported by the enterprise in survey returns. Because industry and region are assigned at the geographic level in the Longitudinal Business Frame, the assignment of employees to the wrong geographic unit within an enterprise, leads to some employees being assigned the wrong industry and/or region.

For more information on LEED and the various repair processes used to create the data refer to the LEED documentation on Statistics New Zealand's website (www.stats.govt.nz/browse_for_stats/income-and-work/employment_and_unemployment/leed/references.aspx)

The LEED data we used covers April 1999 – March 2009. All earnings figures in this paper have been converted to constant March 2009 dollars using the Consumers Price Index.

[34] These occur when the Longitudinal Business Frame incorrectly records a business as having ceased operation and creates a new one, when in fact the business is an ongoing concern. LEED has 'repair' processes that try to fix this by creating longitudinal links (permanent business numbers) across geographic units.

The integrated data

The industry training and LEED data were linked using name, date of birth, and sex information. The industry training data included the National Student Number, which meant information from the National Student Index on name, sex, and date of birth could be used for matching purposes.

The IRD data held by Statistics New Zealand includes IRD's client register, which is a list of people who have had an IRD number assigned to them, and includes information on name and date of birth. The register includes anyone who receives wages and salary and has tax deducted by their employer, recipients of benefits and student allowances, and those who are self-employed. Students who take out student loans are also required to register with IRD, and will have an IRD number assigned to them. Tertiary students who have never been employed or received benefits, and have not taken out a student loan are unlikely to have an IRD number assigned to them. Many overseas students will be included in this group. Participants in industry training will generally be employed or self-employed while undertaking training, and were expected to be in LEED.[35]

The overall match rate for participants in industry training to individuals in LEED was 93 percent. Based on the characteristics recorded in the industry training data, there was little difference in the characteristics of those who matched to LEED and those who did not. Up to 2 percent of matches are thought to be false-positive matches, whereby different individuals have been incorrectly linked together.

The *Employment Outcomes of Tertiary Education Technical Report and Feasibility Assessment* (Statistics New Zealand, 2009) includes more information on linking the two data sources.

[35] Two to three percent of trainees were classified as self-employed or volunteers in the industry training data on the basis of programme category code. Among those that were matched, around 4 percent were self-employed.

APPENDIX B: SUPPLEMENTARY TABLES AND FIGURES

Table 13: Selection of the study population used to estimate the impact of training on employment

Step	Selection criteria	Total	Highest qualification gained							
			None	LCP	Level 1 certificate	Level 2 certificate	Level 3 certificate	Level 4 certificate	Level 5 certificate	Certificate (all levels)
1	All training spells of trainees aged 20–64 that began and ended between January 2003 and December 2008	143,470	82,760	11,560	5,370	14,430	14,290	14,290	1,590	49,960
2	In waged employment for at least 6 of the 12 months before the start of training spell	119,220	66,050	9,990	5,080	12,530	12,530	11,600	1,470	43,190
3	Case-matched to at least one comparable non-trainee	105,890	57,770	8,910	4,500	11,540	11,240	10,550	1,370	39,200
	Percent retained between steps 1 and 2 (%)	83.1	79.8	86.4	94.6	86.8	87.7	81.2	92.5	86.4
	Percent retained between steps 2 and 3 (%): match rate	88.8	87.5	89.2	88.6	92.1	89.7	90.9	93.2	90.8
	Final sample as a percent of all trainees (%)	73.8	69.8	77.1	83.8	80.0	78.7	73.8	86.2	78.5

Note: LCP = limited credit programme.

Table 14: Characteristics of 'employment' study population and matched comparison group, by level of highest qualification gained and sex

	Limited credit programme				Level 1 certificate				Level 2 certificate			
	Female		Male		Female		Male		Female		Male	
Characteristic	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**
Number of observations	4.950	22,170	3,930	16,240	2,030	8,290	2,450	10,510	5,240	22,850	6,270	27,760
Employment and earnings during the 12 months before training												
Employed every month (%)	81.4	79.3	80.5	80.3	79.4	77.1	75.8	72.8	74.3	74.0	71.4	73.1
Employed at least 6 months (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean number of months employed	11.5	11.5	11.5	11.6	11.4	11.5	11.3	11.4	11.3	11.4	11.3	11.4
Mean monthly earnings	2,360	2,310	3,990	3,900	2,590	2,560	3,880	3,820	2,380	2,320	3,630	3,570
Employment and earnings during the 3 years before training												
Employed every month (%)	48.6	49.9	56.0	54.4	50.5	48.1	50.6	48.6	42.4	42.7	42.8	45.9
Employed for at least 18 months (%)	90.1	90.9	92.7	92.9	94.5	94.2	96.2	95.3	91.0	90.0	93.0	92.7
Mean months employed	31.0	31.2	32.1	32.0	31.9	31.8	32.4	32.1	30.7	30.4	31.5	31.5
Mean monthly earnings	2,325	2,304	3,948	3,868	2,548	2,575	3,880	3,845	2,334	2,298	3,655	3,601
Benefit receipt during 3 years before training												
Received benefit income (%)	27.1	26.9	15.0	16.3	35.8	31.5	29.2	27.5	32.4	28.9	24.9	23.6
Mean months on benefit	4.5	4.6	1.5	1.7	5.7	5.2	2.9	2.7	4.6	4.3	2.1	2.1
Mean months on benefit (if received any benefit)	16.7	17.0	10.3	10.3	15.8	16.5	9.9	9.7	14.3	14.9	8.3	9.1
Self-employment during 3 years before training												
Received income for self-employment (%)	12.4	15.0	16.4	17.3	10.4	14.2	11.7	12.8	11.4	13.5	14.2	15.5
Mean months received income from self-employment	2.8	3.3	3.3	3.7	2.2	3.1	2.1	2.6	2.2	2.9	2.8	3.3
Mean months received income from self-employment (if received any income)	22.4	22.2	20.2	21.4	21.4	21.6	18.1	20.5	19.2	21.5	19.6	21.2
Mean monthly income from self-employment	44	69	46	88	33	46	14	43	27	64	36	83
Mean monthly income from self-employment (if received any income)	500	616	490	715	442	477	219	503	358	623	422	767
Employment and earnings during the first year after completion												
Employed every month (%)	74.2	70.6	75.6	72.1	69.3	66.9	60.1	63.8	69.4	64.7	66.1	64.9
Employed at least 6 months (%)	89.8	88.0	90.6	90.0	90.1	88.1	88.3	88.1	88.9	85.2	89.4	87.1
Mean number of months employed	10.6	10.3	10.7	10.5	10.5	10.2	10.0	10.1	10.4	9.9	10.3	10.1
Mean monthly earnings	2,608	2,570	4,304	4,166	2,745	2,767	3,934	4,083	2,731	2,614	4,004	3,897

	Limited credit programme				Level 1 certificate				Level 2 certificate			
	Female		Male		Female		Male		Female		Male	
Characteristic	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**	**Study**	**Comp.**
Self-employment during the first year after completion												
Received income for self-employment (%)	9.3	10.8	11.2	12.5	7.6	9.9	8.3	10.5	7.7	10.9	9.9	12.0
Mean monthly income from self-employment	36.7	77.1	55.8	101.8	28.7	56.8	37.7	65.9	30.2	77.7	55.0	110.3
Mean monthly income from self-employment (if received any income)	465	780	629	901	407	640	490	716	464	791	688	1,028
Dependent variable												
Change in employment status 12 months before and after training	-0.064	-0.089	-0.059	-0.084	-0.083	-0.101	-0.099	-0.101	-0.072	-0.104	-0.086	-0.104
Difference in the change in employment status	0.025		0.025		0.018		0.002		0.032		0.018	

Table 14 *continued*

Characteristic	Level 3 certificate				Level 4 certificate				Level 5+ certificate			
	Female		Male		Female		Male		Female		Male	
	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.
Number of observations	4,740	19,880	6,470	27,120	2,870	12,430	7,640	32,410	390	1,740	990	4,240
Employment and earnings during the 12 months before training												
Employed every month (%)	81.3	80.3	86.9	85.5	82.3	81.2	82.3	81.5	85.8	87.3	93.3	93.6
Employed at least 6 months (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean months employed	11.5	11.5	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.7	11.8	11.9
Mean monthly earnings	2,770	2,730	4,120	4,050	3,220	3,170	3,910	3,850	4,170	4,040	6,240	6,000
Employment and earnings during the 3 years before training												
Employed every month (%)	49.8	49.6	60.8	59.7	51.9	51.3	55.4	54.9	63.7	61.0	83.4	78.9
Employed for at least 18 months (%)	92.8	91.9	95.3	94.2	95.2	93.1	94.5	92.5	97.2	94.2	97.4	96.7
Mean months employed	31.7	31.4	33.0	32.5	32.4	31.8	32.6	31.8	33.5	32.8	34.6	34.2
Mean monthly earnings	2,756	2,698	4,120	4,053	3,218	3,148	4,003	3,904	4,139	4,016	6,339	6,083
Benefit receipt during 3 years before training												
Received benefit income (%)	22.9	23.0	13.0	14.6	20.1	19.1	13.1	16.3	10.6	12.3	2.0	3.3
Mean months on benefit	3.2	3.2	1.0	1.3	2.2	2.2	0.9	1.4	1.0	1.5	0.2	0.2
Mean months on benefit (if received any benefit)	13.9	13.9	7.8	8.9	10.8	11.4	6.6	8.9	9.9	12.5	7.7	7.1
Self-employment during 3 years before training												
Received income for self-employment (%)	12.4	14.9	14.9	17.5	15.2	17.2	17.1	19.1	18.4	21.2	24.7	26.4
Mean months received income from self-employment	2.5	3.1	2.9	3.7	3.1	3.7	3.6	4.1	4.2	4.9	5.7	6.7
Mean months received income from self-employment (if received any income)	19.8	20.7	19.7	20.9	20.4	21.6	20.8	21.3	23.0	23.0	23.2	25.2
Mean monthly income from self-employment	29	55	51	90	61	89	65	118	22	91	13	59
Mean monthly income from self-employment (if received any income)	367	528	578	722	578	682	582	862	170	562	102	369

Characteristic	Level 3 certificate				Level 4 certificate				Level 5+ certificate			
	Female		Male		Female		Male		Female		Male	
	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.	Study	Comp.
Employment and earnings during the first year after completion												
Employed every month (%)	76.0	66.8	80.8	72.8	73.1	67.1	73.0	67.2	79.3	72.7	86.1	82.6
Employed at least 6 months (%)	90.8	83.3	91.3	86.0	88.2	83.4	86.3	81.7	92.7	84.7	92.0	90.2
Mean months employed	10.6	9.8	10.8	10.1	10.4	9.7	10.2	9.6	10.9	10.0	11.0	10.8
Mean monthly earnings	3,253	3,128	4,647	4,491	3,745	3,585	4,735	4,458	4,835	4,522	6,843	6,434
Self-employment during the first year after completion												
Received income for self-employment (%)	8.2	11.7	10.9	14.2	13.3	14.9	16.3	17.7	15.1	17.2	18.1	20.8
Mean monthly income from self-employment	37.2	81.8	84.0	160.7	102.6	126.3	151.6	219.3	49.3	169.8	60.8	118.6
Mean monthly income from self-employment (if received any income)	541	797	854	1,261	911	966	1,113	1,389	370	1,117	375	624
Analysis variable												
Change in employment status 12 months before and after training	-0.069	-0.127	-0.068	-0.119	-0.072	-0.104	-0.086	-0.104	-0.092	-0.130	-0.122	-0.139
Difference in the change in employment status	0.059		0.051		0.032		0.018		0.038		0.018	

Table 14 *continued*

Characteristics	No qualification gained and did not complete a limited credit programme			
	Female		Male	
	Study	Comp.	Study	Comp.
Number of observations	20,040	83,990	37,490	154,380
Employment and earnings during the 12 months before training				
Employed every month (%)	73.8	74.6	76.1	77.5
Employed at least 6 months (%)	100.0	100.0	100.0	100.0
Mean months employed	11.3	11.3	11.4	11.4
Mean monthly earnings	2,530	2,490	3,750	3,690
Employment and earnings during the 3 years before training				
Employed every month (%)	35.3	44.0	42.6	50.0
Employed for at least 18 months (%)	89.6	90.1	92.5	91.7
Mean months employed	30.0	30.5	31.2	31.3
Mean monthly earnings	2,509	2,514	3,749	3,712
Benefit receipt during 3 years before training				
Received benefit income (%)	32.6	26.6	23.3	20.1
Mean months on benefit	4.8	3.9	2.1	2.0
Mean months on benefit (if received any benefit)	14.8	14.8	9.2	9.9
Self-employment during 3 years before training				
Received income for self-employment (%)	13.8	15.2	17.8	17.6
Mean months received income from self-employment	2.6	3.2	3.3	3.6
Mean months received income from self-employment (if received any income)	19.0	21.0	18.6	20.7
Mean monthly income from self-employment	41	65	68	109
Mean monthly income from self-employment (if received any income)	464	597	642	865
Employment and earnings during the first year after completion				
Employed every month (%)	53.9	63.1	56.0	66.1
Employed at least 6 months (%)	71.5	81.9	73.4	83.7
Mean months employed	8.3	9.5	8.6	9.8

Characteristics	No qualification gained and did not complete a limited credit programme			
	Female		Male	
	Study	Comp.	Study	Comp.
Mean monthly earnings	2,908	2,875	4,137	4,115
Self-employment during the first year after completion				
Received income for self-employment (%)	11.2	12.2	15.4	14.5
Mean monthly income from self-employment	65.9	91.5	161.8	173.7
Mean monthly income from self-employment (if received any income)	677	849	1,201	1,330
Analysis variable				
Change in employment status 12 months before and after training	-0.049	-0.113	-0.069	-0.089
Difference in the change in employment status	0.064		0.020	

Table 15: Estimated impact of gaining a qualification on the change in log earnings during the first year after completing training, by level of highest qualification gained, age, and sex, study population and matched comparison group, all training spells during 2003–2005

	Level 1–2			Level 3			Level 4			Level 5+		
Characteristic	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**
Total	**0.021**	0.005	2,730	**0.039**	0.005	2,490	**0.039**	0.006	1,610	**0.069**	0.012	260
Sex												
Female aged 25–64	**0.025**	0.008	1,320	**0.030**	0.011	1,020	**0.036**	0.016	460	**0.095**	0.024	120
Male aged 25–64	**0.018**	0.005	1,410	**0.045**	0.005	1,470	**0.040**	0.006	1,150	**0.047**	0.012	140
Sex and age												
Female aged 25–34	**0.047**	0.017	400	**0.077**	0.010	430	**0.048**	0.014	180	s	s	s
Female aged 35–44	**0.029**	0.014	440	0.020	0.020	320	**0.056**	0.026	160	s	s	s
Female aged 45–64	0.003	0.012	470	0.026	0.017	270	-0.001	0.026	120	s	s	s
Male aged 25–34	**0.021**	0.010	520	**0.046**	0.009	560	**0.060**	0.011	460	s	s	s
Male aged 35–44	**0.022**	0.009	450	**0.035**	0.009	480	0.014	0.010	370	s	s	s
Male aged 45–64	0.011	0.009	440	**0.055**	0.009	430	**0.040**	0.008	310	s	s	s

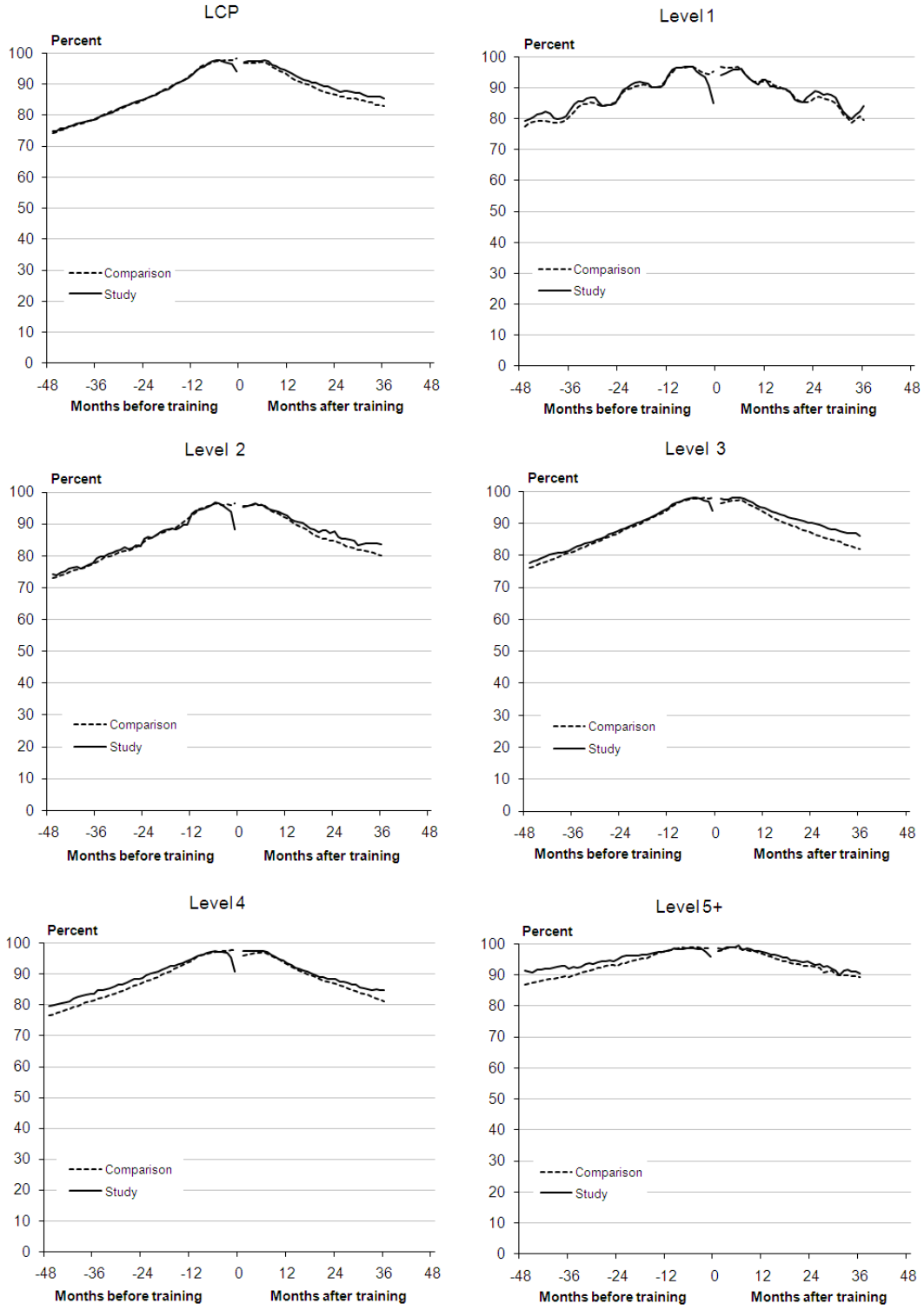
Notes: The dependant variable is change in log average monthly earnings over the 12 months before training started and the 12 months after training ended. Estimates in bold are statistically significant at the 5 percent level. 'N' refers to the number of trainees in the study population. Estimates that do not meet confidentiality or minimum sample size requirements have been suppressed (s).

Table 16: Estimated impact of gaining a qualification on the change in log earnings during the third year after completing training, by level of highest qualification gained, age, and sex, study population and matched comparison group, all training spells during 2003–2005

	Levels 1–2			Level 3			Level 4			Levels 5+		
Characteristic	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**	**Est**	**SE**	**N**
Total	**0.016**	0.007	2,500	**0.032**	0.007	2,260	**0.039**	0.009	1,500	**0.129**	0.018	230
Sex												
Female aged 25–64	0.012	0.013	1,200	**0.027**	0.015	910	**0.055**	0.023	430	**0.170**	0.034	100
Male aged 25–64	**0.020**	0.008	1,310	**0.037**	0.007	1,360	**0.032**	0.009	1,060	**0.097**	0.018	130
Sex and age												
Female aged 25–34	-0.006	0.027	360	0.012	0.026	360	0.028	0.042	170	s	s	s
Female aged 35–44	0.026	0.021	400	0.027	0.026	300	**0.086**	0.036	150	s	s	s
Female aged 45–64	0.014	0.019	430	0.050	0.026	250	0.055	0.040	110	s	s	s
Male aged 25–34	0.019	0.015	480	0.027	0.014	510	**0.041**	0.015	400	s	s	s
Male aged 35–44	**0.027**	0.012	420	**0.029**	0.012	430	**0.032**	0.014	360	s	s	s
Male aged 45–64	-0.016	0.012	400	**0.055**	0.011	410	0.019	0.015	300	s	s	s

Notes: The dependant variable is change in log average monthly earnings over the 12 months before training started and the 25–36 months after training ended. Estimates in bold are statistically significant at the 5 percent level. 'N' refers to the number of trainees in the study population. Estimates that do not meet confidentiality or minimum sample size requirements have been suppressed (s).

Figure 2: Employment rates in the months before and after the training spell, main study population, by highest qualification gained



Note: LCP = limited credit programme.

Figure 3: Employment rates in the months before and after the training spell, employment study population, by sex and highest qualification gained

Female

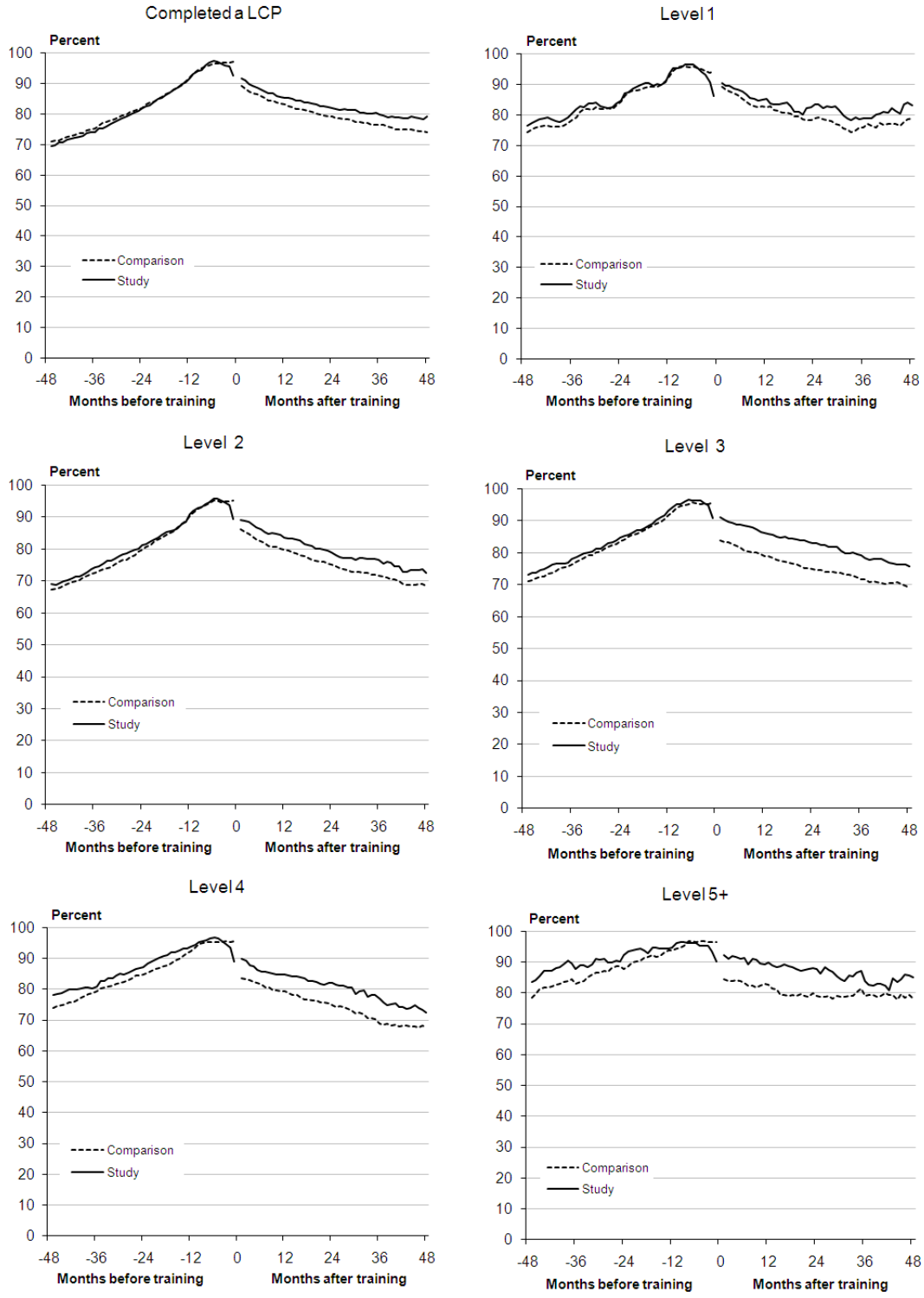
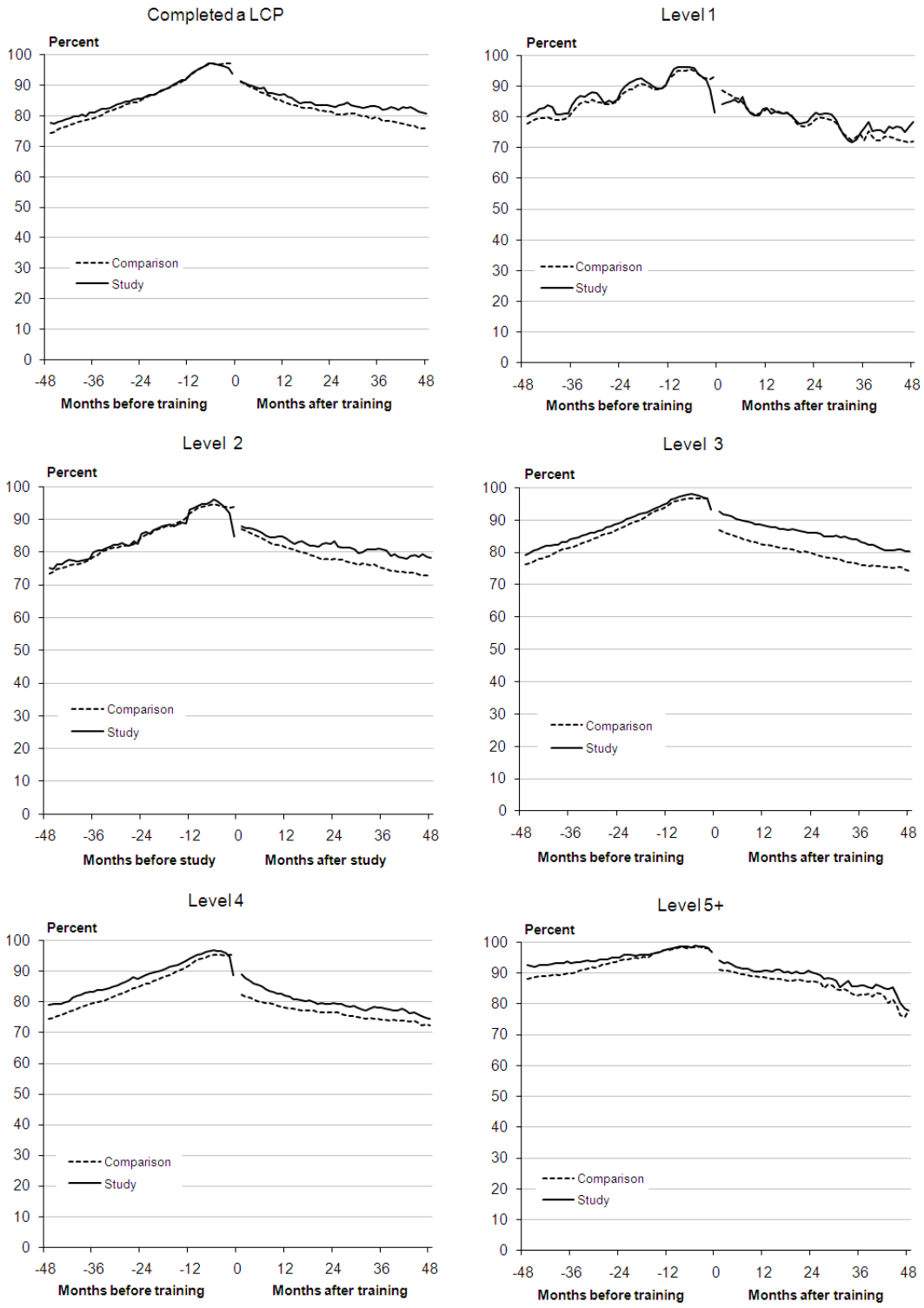


Figure 3 *continued*

Male



Note: LCP = limited credit programme.

Figure 4: Average monthly earnings in the months before and after the training spell, by highest qualification gained and sex, training spells during 2003–2005

Female

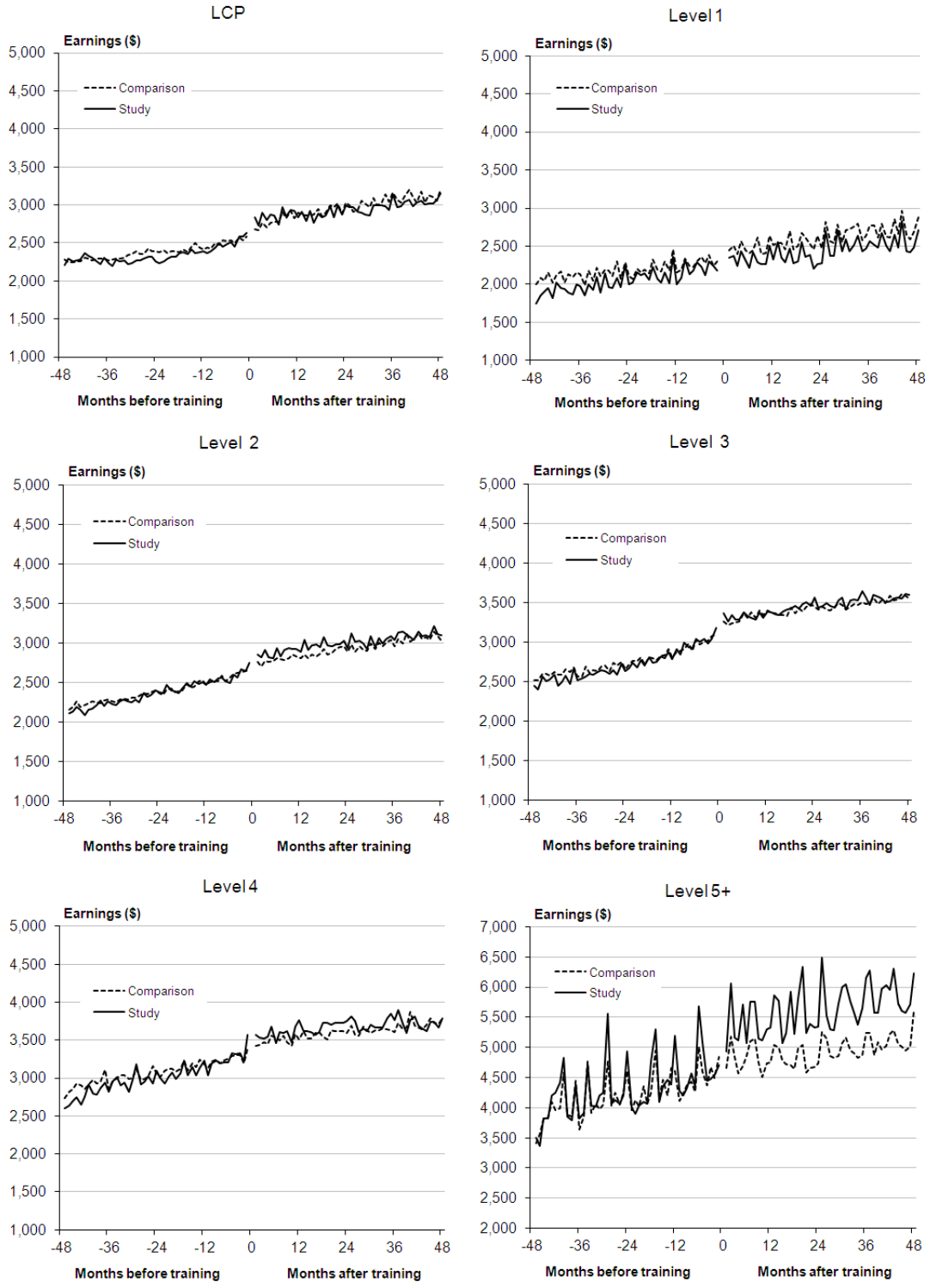
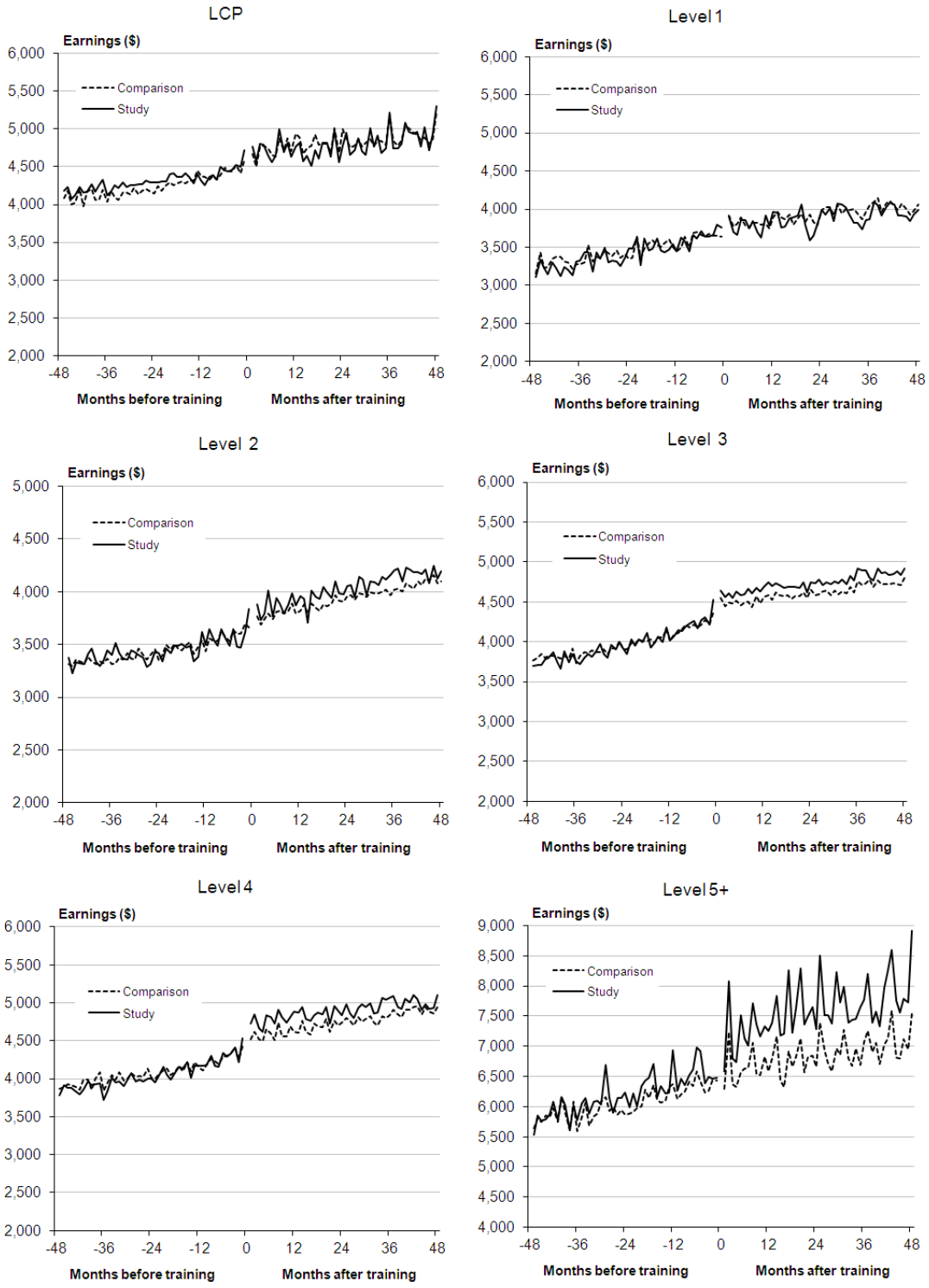


Figure 4 *continued*

Male



Note: LCP = limited credit programme.

Figure 5: Average monthly earnings in the months before and after training, for those that did not gain a qualification or complete a limited credit programme, by level of qualification first enrolled in and sex, training spells during 2003-08

Female

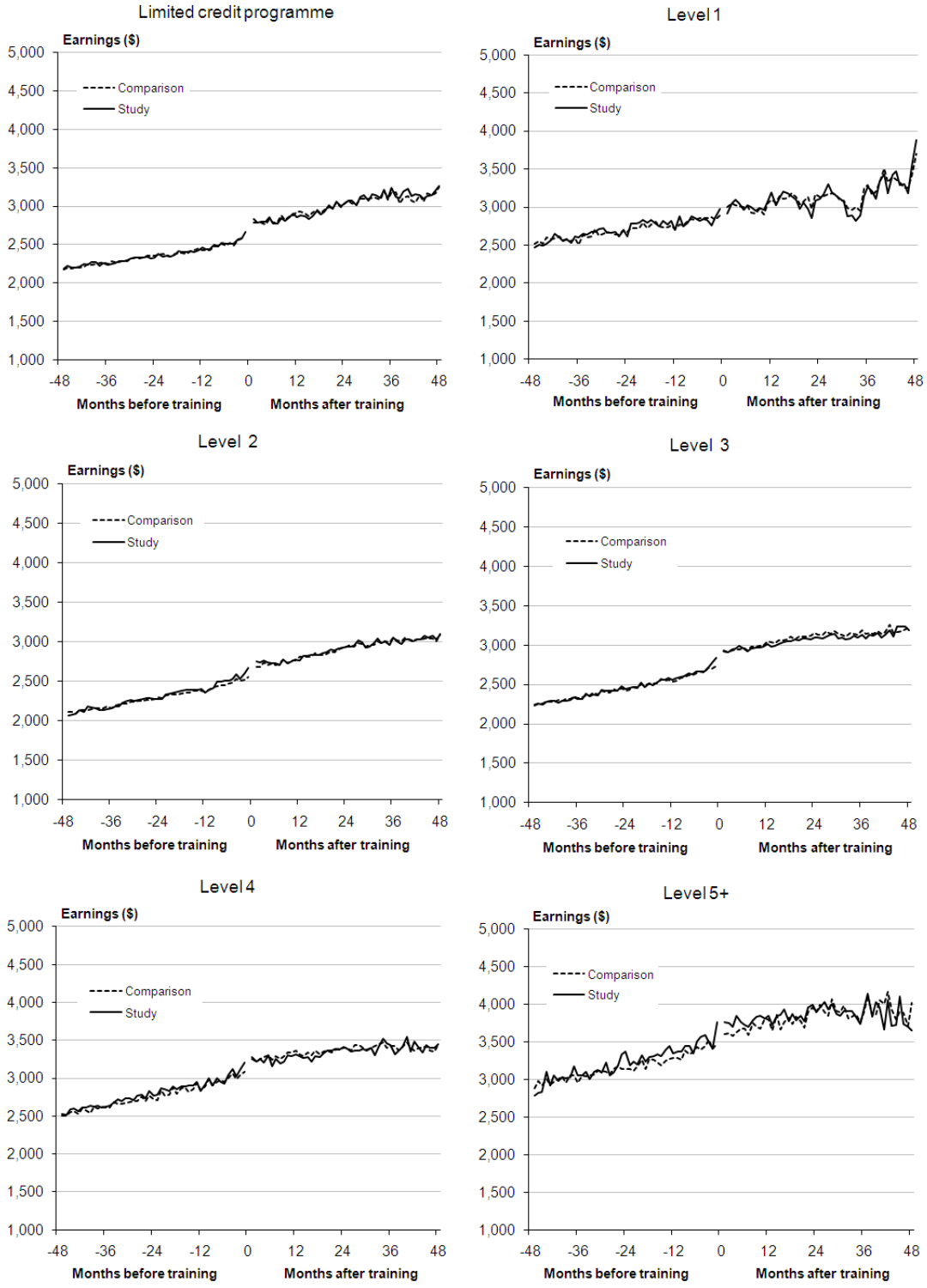
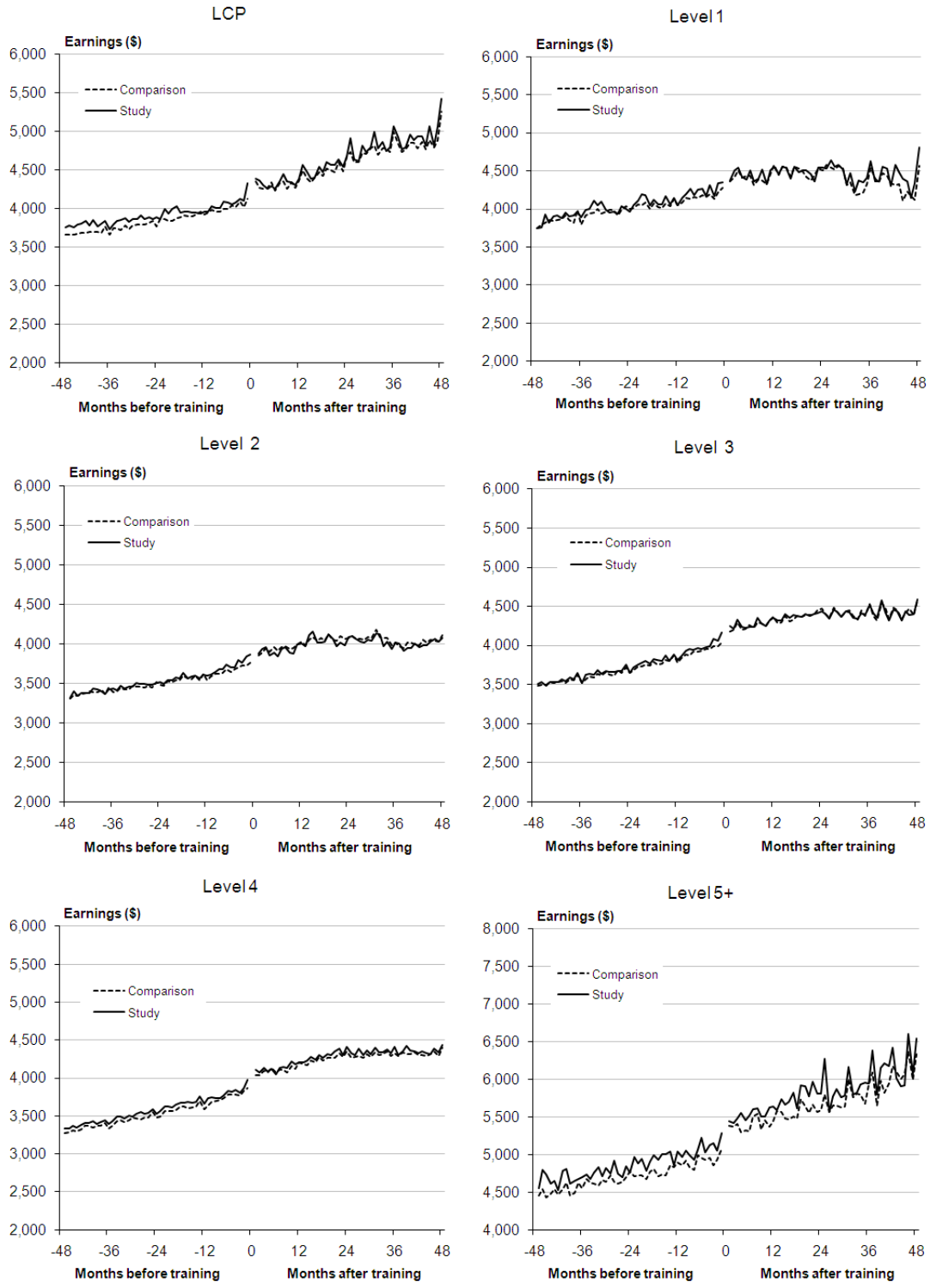


Figure 5 *continued*

Male



Note: LCP = limited credit programme.

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