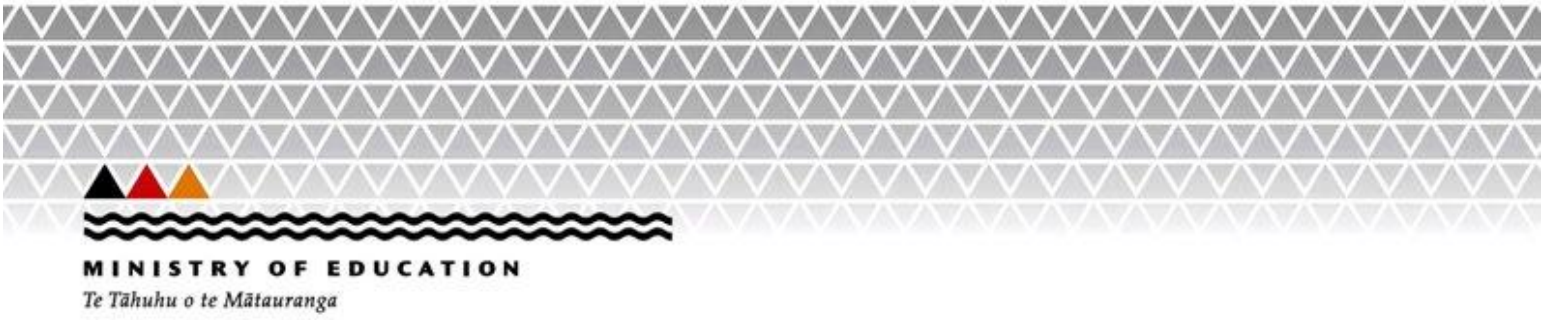

What do men and women earn after their tertiary education?

New Zealand Government

Tertiary education occasional paper 2011/02

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Acknowledgements
The author gratefully acknowledges comments provided by Roger Smyth (Ministry of Education), Katy Stokes (Statistics New Zealand) and Sylvia Dixon (Department of Labour). The author also thanks Mieke Wensvoort (Ministry of Education) for proofreading the document.

All views expressed in this paper, and any remaining errors or omissions, remain the responsibility of the author.

Published by
Tertiary Sector Performance Analysis and Reporting
Strategy and System Performance
MINISTRY OF EDUCATION

This paper is available from the Ministry of Education's Education Counts website: www.educationcounts.govt.nz

September 2011

ISSN 1179-5026 (online)

WHAT DO MEN AND WOMEN EARN AFTER THEIR TERTIARY EDUCATION?

KEY FINDINGS

- Post-study income appears to be influenced by variables associated with tertiary study, such as completion of qualifications, the level of study and the field of study. Earnings generally increase with the level of study and there is a premium for completing qualifications for both males and females.
- There are differences between male and female participation and earnings in the labour market post-study. When controlling for participation in the labour market, males earn more than women after their tertiary education.
- These differences persist over the course of employment, but females' earnings increase less than males' over the four years post-study so that females earn less than males at all levels after four years.
- Females have a better return to tertiary education than males when measured by earnings premium over the national median earnings by gender but this may be in part due to the low overall baseline wages of females compared to males.
- There is evidence to suggest the better returns for women entering the workforce from study are due to gaining greater access to work.
- It is likely that labour market influences that have not been quantified in this study, such as industry and occupation worked in, also influence earnings differences between men and women after study. Future studies will make adjustments for these.

Introduction

This paper looks at the relationship between young peoples' tertiary education qualifications and their employment and earnings once they finish their tertiary study. It builds on previous statistical analysis published by the Ministry of Education and Statistics New Zealand on post–study earnings from tertiary education. It has a particular focus on differences in the post-study earnings between males and females, using the Employment Outcomes of Tertiary Education (EOTE) dataset.

It finds females generally earn less than males at most levels of study. It does not control for labour market variables such as hours and weeks worked, or occupation as data on these is not available in EOTE. Adjustments for firm size and industry worked in could be applied in future studies.

Previous findings

Scott (2009) used the Employment Outcomes of Tertiary Education (EOTE) dataset held by Statistics New Zealand to examine the influence of tertiary education on post-study earnings of young students one and three years after leaving study in 2003.

EOTE links administrative data from education agencies on participation and achievement in institution-based and workplace-based tertiary education, with employment data from the Linked Employer-Employee Database (LEED). LEED holds longitudinal employment and income data on individual workers, together with information regarding the firms they work for.

Scott found there were differences in post-study earnings associated with a number of factors, such as the level of study, the field of study and whether the young person completed their qualification. For example, for young domestic students last enrolled in tertiary education in 2003, median annual earnings three-year post-study were:

- 51 percent higher for those with a bachelors degree compared to those with a level 1 to 3 certificate
- 30 percent higher for those with a bachelors degree compared to with those with a diploma.

Scott found that completing a bachelors degree is associated with 29 percent higher earnings than those young students who studied for a bachelors qualification but left without completing their degree – the biggest advantage for completing a qualification observed.

Students' earnings post-study also differ by various fields of study. In general, qualifications in more vocationally-specific or professionally-associated fields, such as engineering, information technology, architecture and building, and health earned most.

This paper replicates Scott's extract and treatment of the data, adds an extra year's data and focuses on difference in earnings between males and females.

EOTE

This report was undertaken while the author was on secondment to Statistics New Zealand. Access to the data used in this study was provided by Statistics NZ 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 results presented in this study are the work of the author, however, not Statistics New Zealand.

The tables in this paper contain information about groups of people so that the confidentiality of individuals is protected. These are not official statistics, they have been created for illustrative purposes from the Employment Outcomes of Tertiary Education Feasibility study data.

Methodology

This paper follows Scott's methodology. Briefly, it examines EOTE data on a cohort of domestic students last enrolled in a tertiary institution in 2003. Of these around 118,000 people, Scott focused on a subset of approximately 25 percent, which he called 'young leavers', defined as:

- anyone aged 20 years or under who was studying at certificate level
- aged 22 years or under at diploma level

- aged 24 years or under at degree level (25 or under if their degree was a medical degree)
- aged 25 years or under for anyone who was enrolled in a one-year post-bachelors qualification
- aged 26 years or under for masters, and 28 years or under for doctorate students.

These represent a 'traditional' definition of students, that is, young people who move to tertiary education more or less directly from school and who are likely to be participating in tertiary education for the first time, and subsequently entering the labour market for the first time. Education is likely to have more of a direct influence on earnings for these young learners than it does for older students, many of whom already hold qualifications and/or have a number of years of work experience.

Scott remarked that New Zealand is unusual compared to similar countries in that our geographic location and traditions mean that many young people often leave for spells working overseas, and their choice of work in the period after graduation may reflect the wish to save money for overseas travel rather than longer term career goals that make use of their tertiary education. New Zealand also has a lower proportion of these traditional younger students compared to other OECD countries. This means that, as with Scott's original study, care must be taken when interpreting the extent to which earnings differences between groups can be attributed to education.

This study is intended to supplement Scott's study, rather than replace it. It uses an additional year of earnings data than was available for Scott's (four years of tax data are available for this analysis rather than three), and focuses primarily on the differences in post-study earnings of men and women. Scott adjusted median earnings by a number of factors, including sex, age, ethnic group, level of study, field of study, provider type, industry and firm size of main employer. This study does not adjust earnings for these factors, providing only observed data. Future studies will provide adjustments of this sort to determine the influence of those factors on differences in participation in the labour market and earnings.

As with Scott's study, earnings include income earned through salaries, wages and self-employment income, and excludes any unearned income, such as dividends, interest and benefits.

The addition of a gender variable to the analysis effectively splits the cohort in two, and this means that fewer variable combinations of variables meet Statistics New Zealand's requirements that a cell has a minimum size before data can be released. This is mainly a problem when we look to present earnings by field of study, as in combination with level of study and gender, some cell values become quite small and are therefore suppressed for confidentiality reasons.

Earnings pathway distribution

Participation in the labour market after study may differ between graduates and non-graduates, and between males and females. EOTE enables us to categorise the cohort by their post-study earnings profile across the four years for which data is available. Those who don't have earnings in a year may be (for example):

- Overseas
- On a benefit
- Engaged in unpaid labour such as caring for family members.

Table 1 shows the proportion of cohort members by each of the possible classifications. The earnings pathway variable denotes if cohort members earned income from paid employment in

each of the four years post-study. The variable consists of four digits, with binary values: a '1' denoting earnings, or a '0' showing no earnings in a year.

The indicator reads right to left, with the earliest earnings year (2005) denoted by the first digit on the right and the latest year (2008) denoted by first digit on the left. Therefore '0001' denotes earnings in 2005, but none in 2006-2008 tax years, while the value '0101' indicates earnings in 2005 and 2007, but not in 2006 or 2008, and so on. '1111' denotes earnings in all four tax years post-study.

The majority (61 percent) of 2003 young leavers earned income in all four years post-study. A slightly larger proportion of females (12 percent) than males (10 percent) earn no income in any of the four years post-study ('0000'), while a greater proportion of males (66 percent) earned income in all four years ('1111') than females (57 percent).

Table 1 – young students last enrolled in 2003 by post-study earnings pathway

Earnings pathway indicator	Males	Females	All	Males	Females	All
	Cohort count			Cohort percent		
0000	1.440	1.734	3.174	10%	12%	11%
0001	102	168	267	1%	1%	1%
0010	33	51	81	0%	0%	0%
0011	153	213	366	1%	1%	1%
0100	45	75	123	0%	1%	0%
0101	12	24	39	0%	0%	0%
0110	42	66	111	0%	0%	0%
0111	282	324	606	2%	2%	2%
1000	600	768	1.365	4%	5%	5%
1001	102	195	297	1%	1%	1%
1010	33	69	105	0%	0%	0%
1011	213	249	462	2%	2%	2%
1100	666	897	1.566	5%	6%	5%
1101	201	294	495	1%	2%	2%
1110	867	1.158	2.028	6%	8%	7%
1111	9.300	8.286	17.583	66%	57%	61%
Total	14.103	14.568	28.668	100%	100%	100%

All counts in these tables have been randomly rounded to base 3. This may result in a total not agreeing with the sum of the individual items shown in the table. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Table 2 shows the same variable, but restricted to students who gained a qualification from their study. Of those who earned income all 4 years after study, just under half of these young students (49 percent) completed a qualification (42 percent of males and 59 percent of females). Female graduates (10 percent) are slightly more likely to earn no income in any year post-study compared to male graduates (9 percent), and therefore less likely than all female students (12 percent). The proportion of male graduates earning no income in the four years post-study (9 percent) is almost the same as for all male students in the cohort (10 percent).

Completion of a qualification seems to make a greater difference to getting a job for females than for males. Twelve percent of all females and 10 percent of all males earned no income in any year post study ('0000'), compared to 9 percent of male and 10 percent of female

completers. Female graduates are less likely to earn income in all four years post-study (60 percent) than male graduates (66 percent), compared to all female students in the cohort (57 percent) and all males (66 percent).

Table 2 – young graduates last enrolled in 2003 by post-study earnings pathway

Earnings pathway indicator	Males	Females	All	Males	Females	All
	Cohort count			Cohort percent		
0000	561	801	1.359	9%	10%	10%
0001	39	63	105	1%	1%	1%
0010	12	9	21	0%	0%	0%
0011	54	93	147	1%	1%	1%
0100	15	21	36	0%	0%	0%
0101	0	6	9	0%	0%	0%
0110	12	30	42	0%	0%	0%
0111	108	138	246	2%	2%	2%
1000	285	384	672	5%	5%	5%
1001	54	111	165	1%	1%	1%
1010	12	30	42	0%	0%	0%
1011	87	129	216	1%	2%	2%
1100	327	525	855	5%	6%	6%
1101	93	171	264	2%	2%	2%
1110	402	720	1.122	7%	9%	8%
1111	3.939	4.848	8,790	66%	60%	62%
Total	6.000	8.082	14.082	100%	100%	100%

All counts in these tables have been randomly rounded to base 3. This may result in a total not agreeing with the sum of the individual items shown in the table. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Earnings in all four years post-study

To control for differences between males' and females' participation in the labour market post-study, the following analyses are restricted to cohort members who earned income in all four years post-study. Table 3 shows the distribution of this '1111' cohort who completed a qualification by their level of study and gender.

Of young people who earn income all four years post-study, there are more females than males distributed at bachelors level or above. The corollary of this is that males are distributed more at the lower levels of study than females.

Males who complete a qualification at certificate level (levels 1-4) are more likely to earn income in all four years than equivalent females. The gap between males and females is narrower for diploma and bachelors degree graduates.

The only level where completing females are more likely than equivalent males to earn income in all four years post-study is the post-bachelors certificates or diplomas level: 59 percent of these females earned income all four years, compared to 54 percent of equivalent males.

Table 3 – Number and percent of young graduates who earned all 4 years post-study by qualification level

Level of study	Males	Females	Males	Females	Males	Females
	Number		Cumulative percent distribution		Percent earning income all four years	
Level 1-3 Certificate	1,245	975	32%	20%	78%	63%
Level 4 Certificate	384	459	41%	30%	77%	66%
Diploma	528	582	55%	42%	69%	67%
Bachelors	1,248	1,959	86%	82%	59%	57%
Post-bachelors Cert or Dip	363	723	96%	97%	54%	59%
Masters	147	135	99%	100%	55%	50%
Doctorate	27	12	100%	100%	41%	29%
Total	3,942	4,845				

All counts in these tables have been randomly rounded to base 3. This may result in a total not agreeing with the sum of the individual items shown in the table. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

One year post-study earnings

Table 4 shows one year median post study earnings by qualification completion status. As Scott demonstrated, earnings generally increase with the level of study, and there is a premium for completing qualifications which holds for both males and females, with the exception of masters students.

Males who completed their qualification earned more than females one-year post-study at all levels except at bachelors and post-bachelors certificate or diploma level. Non-completing males consistently earned more than non-completing females post-study.

These data suggest that completion makes more of a difference one year post-study in relative median income for females than it does for males. The difference in median incomes between completing and non-completing people is generally higher for females than males. This may be due to a real difference between male and female earnings, or may be explained by occupations and industry, field of study or other labour market related differences not examined in this study.

There is also a difference between males and females with respect to the level of study required for earnings to surpass the national median for their gender. Completing males need to have studied to at least bachelors level in order to earn income greater than the national median income for males in 2005. Females reach the national median earnings for women after study in level 4 certificates.

This difference may be a consequence of a generally lower national median income for females than males, but raises questions about the relative pay-off of study. The pay-off or income premium for females seems to be greater than for males in the short term.

Table 4 – One year median post-study earnings for young students last enrolled in 2003 by level of study

	Males			Females		
	Completing	**Not completing**	**Difference**	**Completing**	**Not completing**	**Difference**
Level of study	**Median Earnings**					
Level 1-3 Certificate	$22,520	$21,130	$1,390	$18,720	$16,800	$1,920
Level 4 Certificate	$22,240	$21,360	$880	$21,580	$20,960	$620
Diploma	$24,580	$23,650	$930	$24,680	$21,770	$2,910
Bachelors	$32,670	$26,450	$6,220	$32,800	$25,910	$6,890
Post-bachelors Cert or Dip	$37,760	$38,060	-$300	$38,120	$36,140	$1,980
Masters	$36,160	$40,560	-$4,400	$35,060	$35,350	-$290
Doctorate	$45,520	S	S	S	S	S
National median gender	$32,650			$20,700		
National median 2005	$26,750					

(1) National median is the median earnings of anyone with earned income in LEED in the tax year 2005
(2) Only leavers who earned income in all four tax years 2005 to 2008 are included, therefore the one-year earnings in this table may differ from one-year earnings reported elsewhere.
(3) Earnings have not been adjusted
All dollar values are rounded to the nearest $10.
S – Suppressed. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Short term earnings premium

Table 5 shows the one year post-study earnings difference compared to the national median earnings in 2005 for men and women (males' earnings are compared to a national median of $32,650 for 2005, while females' are compared to $20,700).

The premium for completion (over non-completion) is higher for females than for males at all levels, except at level 4 certificate, where there is no difference.

Males and females both show a negative short-term premium for completing masters level qualifications over non-completion, but the premium is larger for females than for males. This may be because masters non-completers are necessarily entering the labour market with a bachelors level qualification, since this is a requisite of entry to a masters degree. However the masters degree non-completers enjoy an earnings premium over bachelors completers in the long term (see tables 6 and 7 below).

Table 5 – One year median post-study earnings premium for young students last enrolled in 2003 by level of study

	Males			Females		
	Completing	**Not completing**	**Premium completing over non-completing**	**Completing**	**Not completing**	**Premium completing over non-completing**
Level of study	**proportional difference from national median**			**proportional difference from national median**		
Level 1-3 Certificate	0.69	0.65	0.04	0.90	0.81	0.09
Level 4 Certificate	0.68	0.65	0.03	1.04	1.01	0.03
Diploma	0.75	0.72	0.03	1.19	1.05	0.14
Bachelors	1.00	0.81	0.19	1.58	1.25	0.33
Post-bachelors Cert or Dip	1.16	1.17	-0.01	1.84	1.75	0.10
Masters	1.11	1.24	-0.13	1.69	1.71	-0.01
Doctorate	1.39	S	S	S	S	S
National median 2005	1.00	1.00		1.00	1.00	

(1) National median is the median earnings of anyone with earned income in LEED in the tax year 2005
(2) Only leavers who earned income in all four tax years 2005 to 2008 are included, therefore the one-year earnings in this table may differ from one-year earnings reported elsewhere.
(3) Earnings have not been adjusted
All dollar values are rounded to the nearest $10.
S – Suppressed. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Earnings of young completers over time

The differences in earnings seen one year post-study between males and females who complete their qualification are generally sustained across time after study.

Median earnings generally increase by 10 percentage points on average more for males than for females four years post-study.

Females' earnings do not increase at a faster, or equal rate than males', at any level of study. The one year post-study earnings advantage for females who complete a post-bachelors certificate or diploma over equivalent males does not persist to the second or further years post-study.

Young people who studied at masters and level 4 certificate level had the greatest increase in income across four years, regardless of gender.

Table 6 – Earnings of young completers over time by qualification level

	2 years post study (2006)		3 years post study (2007)		4 years post study (2008)		$ increase in earnings 2005-2008		% increase in earnings 2005-2008	
Level of study	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
	Median earnings									
Level 1-3 Certificate	$27,140	$22,930	$30,740	$25,440	$33,910	$26,760	$11,390	$8,040	51%	43%
Level 4 Certificate	$26,770	$25,910	$30,860	$28,220	$33,670	$31,290	$11,430	$9,710	51%	45%
Diploma	$30,270	$29,510	$34,120	$31,750	$36,540	$33,780	$11,960	$9,100	49%	37%
Bachelors	$39,560	$38,450	$44,990	$41,480	$47,760	$43,380	$15,090	$10,580	46%	32%
Post-bachelors Cert or Dip	$43,030	$41,940	$48,110	$46,340	$52,460	$49,910	$14,700	$11,790	39%	31%
Masters	$45,610	$41,200	$52,380	$45,430	$56,800	$51,040	$20,640	$15,980	57%	46%
Doctorate	$51,930	S	$63,900	S	$66,840	S	$21,320	S	47%	S
National median	$33,780	$21,750	$34,750	$22,760	$36,400	$24,490	$3,750	$3,790	11%	18%

(1) National median is the median earnings of anyone with earned income in LEED in the tax years 2005 to 2008
(2) Only leavers who earned income in all four tax years 2005 to 2008 are included, therefore the one-year earnings in this table may differ from one-year earnings reported elsewhere.
(3) Earnings have not been adjusted
All dollar values are rounded to the nearest $10.
S – Suppressed. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Table 6a shows the earnings and earning premium over level 1 to 3 certificates for young leavers. As Scott found, the premium for those young people with a bachelors degree is significantly higher than those who studied at a lower level, even if they did not complete their qualification, and the premium rises with the level of the qualification. This applies to both males and females, although the premium for females is generally lower than for males.

The premium is sustained across time for people who earned income in all four years post-study. Earnings have not been adjusted for differences in field of study, industry of employment, age, sex, ethnic group, provider type and firm size, as in Scott's study, who found that adjusted premiums for bachelors level earnings were not significant until after three years post-study.

This may also be the case with four year post-study earnings, but this is unclear because this cohort may consist of different people due to the specification that they have earned income all four years post study (Scott's was set at three years post-study). Scott speculated that this gap may reflect a settling-in period as leavers move from more part-time work to more full-time work after study, or as they move from temporary jobs to career-oriented positions. Future studies will provide adjustments to determine if four year earnings follow this pattern.

Table 6a – Earnings and earnings premium over level 1 to 3 certificates of young people over time by qualification level and completion status

	1 year post study (2005)		4 years post study (2008)		1 year post study (2005)		4 years post study (2008)	
Level of study	**Complete**	**Not complete**	**Complete**	**Not complete**	**Complete**	**Not complete**	**Complete**	**Not complete**
	Median earnings ($)				Earnings premium			
Level 1-3 Certificate	$21,170	$20,430	$31,030	$29,790	1.00	1.00	1.00	1.00
Level 4 Certificate	$22,410	$21,700	$32,370	$30,970	1.06	1.06	1.04	1.04
Diploma	$25,250	$23,330	$35,420	$33,820	1.19	1.14	1.14	1.14
Bachelors	$33,350	$26,720	$45,180	$37,500	1.58	1.31	1.46	1.26
Post-bachelors Cert or Dip	$38,140	$37,600	$50,390	$50,110	1.80	1.84	1.62	1.68
Masters	$37,330	$38,860	$53,670	$52,070	1.76	1.90	1.73	1.75
Doctorate	$48,830	s	$66,840	s	2.31	s	2.15	s
National median	$26,750	$26,750	$30,460	$30,460				

(1) Median income applies to all earned income
(2) Median income is shown for young people who earned income in all four years post-study
(3) National median is the median earnings of anyone with earned income in LEED in each tax year
(4) Earnings have not been adjusted
(5) Earnings premium is proportion over earnings at level 1-3 certificate level
All dollar values are rounded to the nearest $10.
S - Suppressed
Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Earnings of young non-completers over time

The differences in earnings seen one year post-study between males and females who do not complete a qualification generally increase across time. Median earnings generally increase by 10 percentage points on average more for males than for females four years post-study.

Females' earnings increase by a greater percentage for masters level than for males across four years post-study but this is the only level for which this occurs and females not completing a masters still earn less than equivalent males after four years.

The short term earnings advantage for non-completers of masters degrees over completers is not sustained over the longer term. Young people who completed masters degrees earned more than equivalent non-completers after three years for males and after four years for females.

Table 7 – Earnings of young non-completers over time by qualification level

	2 years post study (2006)		3 years post study (2007)		4 years post study (2008)		$ increase in earnings 2005-2008		% increase in earnings 2005-2008	
Level of study	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
	Median earnings									
Level 1-3 Certificate	$24,730	$20,410	$27,600	$22,680	$30,610	$23,750	$9,480	$6,950	45%	41%
Level 4 Certificate	$25,950	$23,940	$28,520	$26,760	$31,710	$28,310	$10,350	$7,350	48%	35%
Diploma	$28,260	$25,960	$31,530	$28,650	$35,070	$29,630	$11,420	$7,860	48%	36%
Bachelors	$31,630	$30,300	$34,560	$33,340	$38,400	$34,540	$11,950	$8,630	45%	33%
Post-bachelors Cert or Dip	$45,310	$41,670	$51,060	$43,600	$53,330	$43,800	$15,270	$7,660	40%	21%
Masters	$49,200	$41,840	$49,810	$45,620	$52,280	$46,530	$11,720	$11,180	29%	32%
Doctorate	S	S	S	S	S	S	S	S	S	S
National median	$33,780	$21,750	$34,750	$22,760	$36,400	$24,490	$3,750	$3,790		

(1) National median is the median earnings of anyone with earned income in LEED in the tax years 2005 to 2008
(2) Only leavers who earned income in all four tax years 2005 to 2008 are included, therefore the one-year earnings in this table may differ from one-year earnings reported elsewhere.
(3) Earnings have not been adjusted
All dollar values are rounded to the nearest $10.
S – Suppressed. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

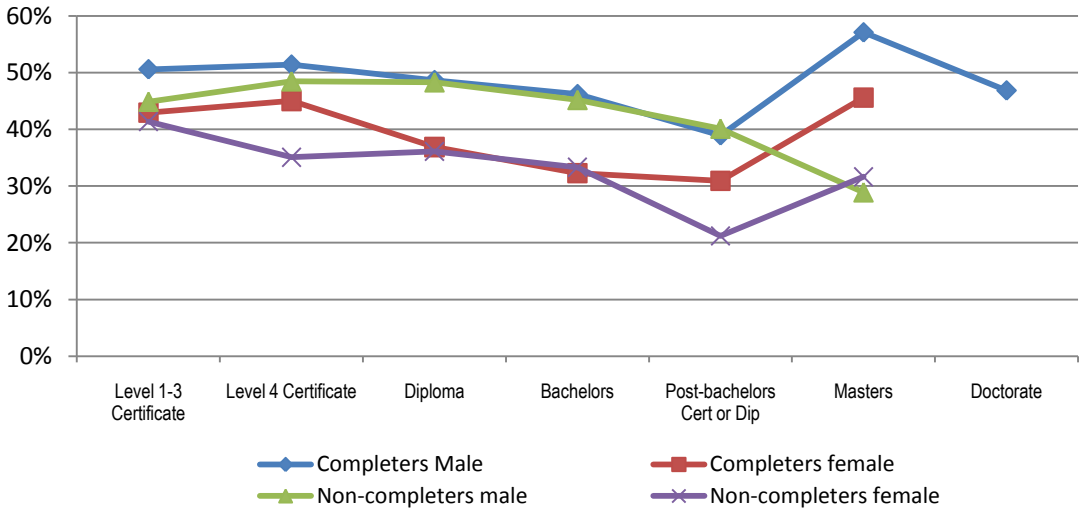
Figure 1 shows the four year growth in median earnings for young learners by completion status and level (these are the final two columns of tables 6 and 7 above shown graphically). Earnings rose slowest for female non-completers at post-bachelors certificate or diploma level, and rose fastest for male completers at masters level.

Earnings increase faster across the four years post-study for males than for females. Earnings consistently increase faster for completers than for non-completers, with the exception of females at bachelors level. Male non-completers' earnings increase faster than female completers', except at masters level.

Earnings for male completers increase fastest at the masters level. This is also the case for equivalent females, but the increase is slower overall for females, and the increase for those females with levels 1-4 certificates is almost as fast.

Earnings increase for male non-completers peaks at diploma level, while for non-completing females it peaks at level 1-3 certificate level.

Figure 1 – Change in earnings over four years of young people by qualification level and completion status



Note: Figures calculated from the Employment Outcomes of Tertiary Education dataset managed by Statistics NZ

Earnings premium

Scott calculated the earnings premium for different qualification levels by comparing them to the earnings of people completing level 1 to 3 certificates. He found that the median earnings for those with a bachelors degree was significantly higher three years post-study than those that studied at lower levels.

Table 8 shows this data (unadjusted) for males and females, this time after four years post-study. The premium is positive and (in most cases) increases with the level of study.

The unadjusted income premium for females is higher for females than males, both for young people completing qualifications and those who do not. This is consistent with Maani and Maloney's (2004) findings that the returns to post-school qualifications are higher for females, despite lower mean income levels. When they controlled for differences in the number of hours worked, however, this difference disappeared. They concluded that the returns to education, measured in terms of hourly earnings, are similar for men and women.

This suggests that one of the benefits to women of higher levels of education is in their greater access to work, in that women with higher levels of education are more likely to be working longer hours. There may also be differences in the number of weeks and /or months worked in a year between males and females. For example, females may also be more likely to work in temporary jobs than males[1], and this study cannot control for this as the number of weeks / months worked is not available in EOTE.

Males may have a smaller premium over certificate earnings because males who study at certificate level may be more likely to work in trades than equivalent females (most trades qualifications are national certificates). Trades have been in high demand recently so have attracted a higher wage. A tight labour market in 2008 characterised by low unemployment and skills and labour shortages particularly in the trades, may have inflated wages for males with certificate level qualifications, so comparisons to certificate level for males may be affected by this more than for females.

[1] See Dixon, S. 2009.

Table 8 – Post-study earnings premiums for young completers last enrolled in 2003

	Young completers				Young non-completers			
	1 year post study		4 years post study		1 years post study		4 years post study	
Level of study	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
Level 1-3 Certificate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Level 4 Certificate	0.99	1.15	0.99	1.17	1.01	1.25	1.04	1.19
Diploma	1.09	1.32	1.08	1.26	1.12	1.30	1.15	1.25
Bachelors	1.45	1.75	1.41	1.62	1.25	1.54	1.25	1.45
Post-bachelors Cert or Dip	1.68	2.04	1.55	1.87	1.80	2.15	1.74	1.84
Masters	1.61	1.87	1.68	1.91	1.92	2.10	1.71	1.96
Doctorate	2.02	S	1.97	S	S	S	S	S

(1) Values based on less than 25 people have not been reported
(2) Differences are based on leavers who earned income in all four tax years 2005 to 2008
(3) Earnings have not been adjusted
Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Earnings by field of study

The following tables show the earnings across years for narrow fields of study by study levels for young people who gained a qualification. Due to Statistics New Zealand's confidentiality rules about the minimum population of cells to ensure confidentiality, it is not possible to show earnings information for all fields undertaken by the cohort at each level by gender.

This poses a particular problem pre-bachelors level in that it limits the numbers of fields for which we can show the post-study earnings.

Level 1 – 3 certificates

Narrow field data reached the confidentiality threshold for only two fields at the level 1 – 3 certificate level: in *Office administration* and *Food and Hospitality*. Young females who studied *Office administration* earned $20,370 one year post study and $29,640 four years post study, while males earned $24,600 after one year and $32,900 after four years.

Females' earnings increased (46 percent) more than males' (34 percent) across four years for people who studied *office administration*, but males still earned more than females all years post-study. Males who studied *food and hospitality* earned ($33,010) more than equivalent females ($25,400), and their earnings increased more over four years (53 percent vs. 37 percent).

Level 4 certificates

Narrow field data reached the confidentiality threshold for only two fields at the level 4 certificate level: in *tourism* and *food and hospitality* fields.

Females who studied *tourism* earned $23,690 one year post study and $34,480 four years post study while males earned $22,550 after one year and $37,330 after four years.

For young people who studied *tourism*, females' earnings increased (46 percent), less than males' (66 percent) across four years.

Males who studied *food and hospitality* at level 4 earned ($23,760 after 1 year, $33,840 after 4 years) more than equivalent females ($22,080 after one year, $29,770), and their earnings increased more over four years (42 percent vs. 35 percent).

Diploma level

Table 9 shows the post-study earnings for 2003 leavers who completed a diploma level qualification. Females who studied *business and management* earned more than males one year post-study but their earnings increased less than males. Males accordingly earned more than females after four years.

Females who studied *sport and recreation* earned more than men both one year and four years post-study, but their earnings increased less than males'.

Females who studied *graphic and design studies* earned more than males four years post study, and their earnings increased more than males'.

Females who studied *communications and media studies* earned more than males four years post-study, and their earnings increased less than males' during that time.

Table 9 – Median earnings four years post-study for young diploma completers last enrolled in 2003 by selected narrow field of study

	1 year post study		4 years post study		diff 1 and 4 years post study		% change 1 and 4 years post study	
Field of specialisation	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
	Median earnings							
Business and management	$25,890	$26,660	$39,470	$34,610	$13,580	$7,950	52%	30%
Sport and recreation	$19,530	$22,680	$29,500	$30,450	$9,970	$7,770	51%	34%
Graphic and design studies	$23,980	$23,350	$35,120	$35,740	$11,140	$12,390	46%	53%
Communication and media studies	$22,320	$23,440	$35,000	$36,120	$12,680	$12,680	57%	54%
All diploma completers	$24,580	$24,680	$36,540	$33,780	$11,960	$9,100	49%	37%

(1) Earnings for fields with less than 25 people have been suppressed. Students may have more than one field.
(2) Earnings are for young graduates who earned income in all four years post study.
(3) Earnings have not been adjusted
All dollar values are rounded to the nearest $10.
S – Suppressed. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Bachelors level

Table 10 shows the post-study earnings of young learners who completed a bachelors qualification. Females who studied *computer science, information systems, medical studies, teacher education, other society and culture, graphic and design studies* and *communication and media studies* fields earned more than males one year post-study. However, for all shown narrow fields, males earned more than females four years after study.

Males' earnings increased faster than females for all fields studied barring those who studied *architecture and urban environment, law* and *performing arts.*

Where females' median earnings increased faster than males' (for example for young people completing law qualifications), male earnings four years post-study were still greater than females' because females' short term earnings were also smaller.

The *teacher education* field is interesting. Teachers are paid accordingly to a collective contract that stipulates salary advancement according to experience and time in the profession, so it is reasonable to expect that males and females should theoretically earn the same short and long-term.

However, males earn more than females after four years. For young people working in teaching after studying *teacher* education, males may be more likely to volunteer for additional management teaching units, which supplement the standard teaching income, and / or may be more likely to accept postings at hard to staff schools which attract incentive payments. Some young people who study *teacher education* may not go into other occupations than teaching and hence may earn more money in higher paid occupations. It may be that males are more likely to do this than females.

Table 10 – Median earnings four years post-study for young bachelors completers last enrolled in 2003 by selected narrow field of study

	1 year post study		4 years post study		diff 1 and 4 years post study		% change 1 and 4 years post study	
Field of specialisation	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
	Median earnings							
Computer Science	$34,060	$35,330	$53,460	$51,270	$19,400	$15,940	57%	45%
Information Systems	$32,290	$34,820	$50,560	$50,570	$18,270	$15,750	57%	45%
Architecture and Urban Environment	$33,950	$31,390	$50,000	$47,830	$16,050	$16,440	47%	52%
Medical Studies	$74,000	$75,410	$103,680	$97,120	$29,680	$21,710	40%	29%
Teacher Education	$34,510	$35,130	$45,670	$43,270	$11,160	$8,140	32%	23%
Law	$39,710	$36,530	$58,150	$54,000	$18,440	$17,470	46%	48%
Other Society and Culture	$26,580	$28,900	$45,170	$39,740	$18,590	$10,840	70%	38%
Performing Arts	$20,070	$15,090	$30,840	$32,240	$10,770	$17,150	54%	114%
Visual Arts and Crafts	$22,340	$20,020	$39,300	$31,460	$16,960	$11,440	76%	57%
Graphic and Design Studies	$22,440	$25,720	$38,890	$36,540	$16,450	$10,820	73%	42%
Communication and Media Studies	$31,050	$31,060	$44,980	$43,250	$13,930	$12,190	45%	39%
All bachelors completers	$32,670	$32,800	$47,760	$43,380	$15,090	$10,580	46%	32%

(1) Earnings for fields with less than 25 people have been suppressed. Students may have more than one field.
(2) Earnings are for young graduates who earned income in all four years post study.
(3) Earnings have not been adjusted
All dollar values are rounded to the nearest $10.
S – Suppressed. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Table 11 shows the proportional difference in earnings of females compared to males one year and four years after study. As already discussed, young people studying a number of fields, such as *computer science*, *medical studies*, *teacher education*, *other society and culture*, and *graphic and design studies*, females' earnings are greater than males' in the short term, but fall behind males' after four years.

Female earnings were on a par with male earnings after four years in only one of the selected fields: *information systems*. While female earnings in *performing arts* increased at double the rate of males over four years, females only earned 5 percent more than males after this time.

Table 11 – Proportion of female median earnings to males' post-study for young bachelors completers last enrolled in 2003 by selected narrow field of study

Field of specialisation	Proportion of female earnings to males 1 year post-study	Proportion of female earnings to males 4 years post-study
Computer Science	1.04	0.96
Information Systems	1.08	1.00
Architecture and Urban Environment	0.92	0.96
Medical Studies	1.02	0.94
Teacher Education	1.02	0.95
Law	0.92	0.93
Other Society and Culture	1.09	0.88
Performing Arts	0.75	1.05
Visual Arts and Crafts	0.90	0.80
Graphic and Design Studies	1.15	0.94
Communication and Media Studies	1.00	0.96
All bachelors completers	1.00	0.91

(1) Earnings for fields with less than 25 people have been suppressed. Students may have more than one field.
(2) Earnings are for young graduates who earned income in all four years post study.
(3) Earnings have not been adjusted
All dollar values are rounded to the nearest $10.
S – Suppressed. Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics NZ.

Conclusions

The focus of this analysis is primarily the observed difference in post-study labour market participation and earnings between young males and females.

This study supplement's Scott's (2009) *What do Students Earn after their Tertiary Education*? with an addition of gender analysis and the benefit of an extra year of post-study earnings data. It uses the Employment Outcomes of Tertiary Education (EOTE) dataset held by Statistics New Zealand to observe the post-study activity and earnings of the same cohort of students, that is, young people who left study in 2003. Scott's main research question, précised, was *what's the value of tertiary education for young people?*

Scott limited his analysis to young people, because it is thought they are less likely to gain earnings on the basis of their work history as they may have relatively little compared to older people. This approach may therefore come closer to isolating the effects of each person's tertiary education experience on their subsequent earnings.

Scott found that, among other things, the value (measured in post-study earnings) of tertiary education increased along with the level of study the young people were engaged in. Young participants in the labour market are rewarded commensurate to the level of learning they achieved in tertiary education. He also found that completing a qualification makes a difference, with young people completing a bachelors degree earning 29 percent more than young people who left without completing their degree.

This study shows there are some differences between males and females in some important indicators of the value of the tertiary education to the young person: participation in the labour market and earnings after study. The main analyses focus on young people earning income in all

four years post-study to control for any participation in the labour market differences between men and women.

There are observed differences between men and women, both in labour market participation and earnings post-study. Males (66 percent) are more likely to earn income all four years than females (57 percent) post-study, but the gap between the proportion of males (66 percent) and females (60 percent) who do narrows slightly when the data is restricted to young people who complete their qualification.

Completing a qualification makes a greater difference for females than for males. Females who gain a qualification are less likely to earn no income all years after study than all young females leaving study in 2003, but they are less likely than equivalent males to earn income in all four years.

Only females completing post-bachelors certificates or diplomas are more likely than equivalent males to earn income in all four years post-study. But there are more females earning income all four years post-study at bachelors level or above than males, whose distribution tends to be skewed more at pre-bachelors levels.

Earnings generally increase with the level of study and there is a premium for completing qualifications which holds for both males and females. There is short term disadvantage to completing a masters degree over non-completion in terms of earnings, but this disadvantage disappears over a longer period; four years following study, masters degree holders are, on average, earning much more than bachelors degree holders.

Non-completing males consistently earn more one year post-study than females, while males who completed their qualification earned more than equivalent females at certificate level and at masters level.

These differences persist over the course of employment post-study, but females' earnings increase less than males' over the four years post-study so that females earn less than males at all levels of study after four years.

The earnings premium above level 1-3 certificate completers is generally higher for females than for males at all levels, but this may be partly due to the disparity in earnings for level 1 female completers which is around $6,000 lower than for males. This might have something to do with a tight labour market for trades persons during the data period, with males doing certificate level qualifications in trades in higher numbers than females.

The unadjusted income premium is higher for females than males, both for young people completing qualifications and those who do not. This is consistent with Maani and Maloney's (2004) findings that the returns to post-school qualifications are higher for females, despite lower mean income levels. When they controlled for differences in the number of hours worked, however, this difference disappeared. They concluded that the returns to education, measured in terms of hourly earnings, are similar for men and women. This study was unfortunately unable to make any adjustment for hours worked because the data source used does not contain this information.

There are some large differences in earnings four years post-study between men and women by field of study. For example, women who studied *medical studies* at bachelors level and earned income all four years post-study appear to earn $6,600 or 6 percent less than males. Earnings differences between males and female graduates in other fields are narrower, and earnings increases across years are consistently larger for males than for females with only one exception.

Females studying *performing* arts at bachelors level are the only group examined who earned more than equivalent males and whose income increased much more than males across four years post-study. There do not appear to be any additional educational explanations for these differences, but they may be due to a number of labour market related factors.

There are a number of caveats to this analysis that mean findings should be interpreted with some caution. As mentioned, there may be differences between the number of hours worked between males and females post-study which cannot be measured using the EOTE data sources, and this may account for some or all of the differences between them in earnings. Maani and Maloney found the returns to education, measured in terms of hourly earnings, are similar for men and women, but that women with higher qualifications are more likely to be working more than women with lower qualifications. This suggests that one of the benefits of higher qualifications for women is to increase access to work. This study does not also take into account the number of weeks and months worked in a year. For example, males may work more weeks and/or months than females, who have a higher rate of employment in temporary jobs than females.

Secondly the data has not been adjusted for other factors such as firm size, industry classification, occupation worked in, level of study and other variables which Scott showed may have some impact on post-study earnings. The field of study does not indicate the industry or occupation worked in, and this analysis does not control for their effects. Thirdly, the source of income applies only to remuneration for employment that occurred in New Zealand, and does not capture any income earned overseas. It is hoped that future studies using this approach will make these adjustments, where possible.

In summary, it appears that there is an unequal benefit to tertiary education between males and females, some of which may be explained by tertiary education increasing females' access to work. Males earn more than females for study at the same levels in most cases, but this may be because women work fewer hours or weeks than men in each year, and it may also reflect differences in occupations and industries worked in between them. Where possible, future studies will test if this is the case.

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References

Maani, S. & Maloney, T. 2004. *Returns to post-school qualifications: New evidence based on HLFS income supplement (1997-2002).* Wellington: Department of Labour.

Dixon, S. 2009. *A profile of temporary workers and their employment outcomes*. Wellington: Department of Labour.

Scott, D. 2009. *What Do Students Earn After Their Tertiary Education?* Wellington: Statistics New Zealand and Ministry of Education.