MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

Post doc

Do people with doctoral degrees get jobs in New Zealand post study?

New Zealand Government

Beyond tertiary study

This report forms part of a series called Beyond tertiary study.
Other topics covered by the series include how graduates' earnings change over time, labour market outcomes, education and economic growth, and qualifications and income.

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SUMMARY

KEY POINTS

This study analysed the New Zealand-based employment rate of a cohort of domestic doctoral graduates who finished studying in 2003. The results show that:

- around 65 percent of the doctoral cohort were employed in New Zealand four years after they last studied. This was a lower rate of employment in New Zealand than domestic bachelors and masters graduates from the same leaving year
- younger graduates, Asians, and graduates in 'Natural and physical sciences' were less likely to be employed in New Zealand four years after they last studied
- the domestic employment rate of the New Zealand doctoral cohort was lower than in similar leaving cohorts in Canada and the United Kingdom.

This report analysed the New Zealand-based employment rate up to four years post study of a cohort of domestic doctoral graduates who last studied in 2003. Doctoral graduates represent a key resource for New Zealand, given their specialised research training, so the New Zealand-based employment rates of these graduates give a sense of how well this important resource contributes to New Zealand's economy.

The results showed that for those domestic students who last studied in 2003 and achieved their doctorate, around 65 percent were employed in New Zealand four years after they last studied. This was lower than for students who last studied at masters (72 percent) and bachelors (75 percent) level.

Not surprisingly, younger doctoral graduates were less likely to be employed in New Zealand post study. Four years after they last studied, the employment rate in New Zealand of graduates aged under 30 when they graduated was 57 percent, compared with 63 percent for graduates aged 30 to 39, and 73 percent for those aged 40 and over. This difference reflects the greater likelihood of younger graduates being overseas.

There was little difference in New Zealand-based employment rates by gender, but Asian graduates were less likely than other ethnic groups to be employed in New Zealand four years after they last studied. On the other hand, Māori graduates were the most likely to be in employment in New Zealand.

By field of study, graduates in 'Natural and physical sciences' were the least likely to be in employment in New Zealand four years after they last studied (with a New Zealand-based employment rate of 57 percent), while graduates in 'Society and culture' were the most likely to be employed in New Zealand (New Zealand-based employment rate of 65 percent).

When compared with Canada and the United Kingdom, the domestic employment rate of doctoral graduates tended to be lower in New Zealand. However, this is likely to reflect the more limited opportunities for graduates to undertake post-doctoral research in New Zealand.

When looking at the sequence of employment of the domestic doctoral graduates, around 56 percent of the cohort were employed in New Zealand for all four years post study, while 21 percent were never employed in New Zealand in any of the four years post study.

In terms of industry destinations of the doctoral graduates, the majority were employed in the 'Education and training' industry, followed by 'Scientific and professional services'.

The study used the Employment Outcomes of Tertiary Education (EOTE) Feasibility Dataset, managed by Statistics New Zealand. Statistics New Zealand has plans to add New Zealand Customs data on border crossings to the employment and education data, which will allow for future analysis to identify who is overseas. This will then allow for a more robust analysis of the utilisation of new doctoral graduates in New Zealand.

1 INTRODUCTION

How graduates from the New Zealand tertiary education system fare in the labour market is an important indicator of the relevance and applicability of their qualifications. For doctoral graduates in particular, because of their specialised research skills that make a crucial contribution to New Zealand's economic and social development, it is especially important that the degree of utilisation of this relatively scarce resource is monitored. Previous analysis has shown that employed doctoral graduates earn a premium over those with lower qualifications (Scott 2009). However, rather than focusing on income premiums, this study uses an integrated dataset maintained by Statistics New Zealand – the Employment Outcomes of Tertiary Education (EOTE) Feasibility Dataset – to analyse what percentage of a cohort of recent doctoral graduates was employed in New Zealand and their industry destination up to four years post study.

The study also compares the employment rate of doctoral graduates with the employment rates of bachelors and masters-level graduates in New Zealand. In addition, the employment rates and industry destinations of doctoral graduates in Canada and the United Kingdom are examined to give an international context to the New Zealand results. These internal and external comparisons are important in helping to assess how atypical the post-study outcomes for doctoral graduates are in New Zealand.

One limitation of this study is that we cannot distinguish between graduates who are taking a break from employment and those who are overseas, where they may well be employed. We present some estimates of the likelihood of doctoral graduates being overseas in order to understand why the rate of employment of some groups in New Zealand is lower than others.

The structure of this report is as follows. First, the data used in this study is explained and concepts defined. Then, the New Zealand-based employment rate of the 2003 leaving cohort is examined in each of the four years post study. This analysis includes a look at the dynamic pathways in and out of employment that the members of the cohort have exhibited over the four-year period. The study then looks at the industry destinations of those cohort members that are in employment. Finally, some conclusions are presented.

2 DATA

2.1 Employment Outcomes of Tertiary Education Feasibility Dataset

This study uses the Employment Outcomes of Tertiary Education (EOTE) Feasibility Dataset. This is a dataset that links an individual's tertiary education records with their tax information from Inland Revenue. More information on EOTE can be found on the Statistics New Zealand website.[1]

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 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 results presented in this study are the work of the author, 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.

2.2 Confidentialisation and suppression of the data

Statistics New Zealand employs strict rules to ensure the confidentiality of students and tertiary providers in the EOTE dataset. These rules include:

- All counts in tables extracted from EOTE have been subject to random rounding to base 3.
- Where the counts in a cell in a table are below 6 they have been suppressed and the cell is shown as having a value of 0.
- Where cells in a table contain graduates from a single tertiary provider, these numbers are suppressed.

2.3 Data definitions

Leaving cohort

The focus of this study is on a cohort of New Zealand resident doctoral graduates who last studied at the doctoral level in 2003. Note that these graduates may have studied at other levels of tertiary education after 2003.

Employment rate

We regard someone who received earnings from wages and salaries or from self-employment in a particular tax year as being employed. So the employment rate is the percentage of the cohort who received earnings of that kind. The earnings in this case refer to earnings that have been declared to the New Zealand Inland Revenue Department. So we cannot identify if a graduate is employed in other countries. In effect, we are looking at what percentage of the cohort was employed in New Zealand, not how many may have been employed in total in New Zealand or overseas.

[1] See http://www.stats.govt.nz/browse_for_stats/Corporate/Corporate/CorporateCommunications_MRSept09.aspx for more detail.

For example, an employment rate of 70 percent doesn't mean that the remaining 30 percent don't have jobs. Some of the 30 percent are likely to have jobs overseas.

Industry

The industry of employment for the leaving cohorts is classified according to the 2006 Australian and New Zealand Standard Industrial Classification (ANZSIC06).[2] Because of the relatively small number of doctoral graduates in this analysis, the focus is on the broader division level, with some limited analysis at the narrower group level. Where a graduate works in two or more industries in a year, we report the one with the highest earnings as the industry of employment.

Field of study

The field of study used in this study is determined using the New Zealand Standard Classification of Education (NZSCED).[3] Because of the small number of doctoral graduates, the focus is on broad level of NZSCED, although some narrow field analysis is undertaken where possible. In this study, the NZSCED of a doctorate in the last year of study was used to classify field of study.

Age

This refers to the age of the graduate on July 1 in their last year of enrolment in doctoral study.

Ethnic group

The ethnic group of the doctoral graduates is selected based on multiple response. In other words, a graduate has been reported in each ethnic group they identify with.

Years post study

This indicates the number of years since the graduate was enrolled in their doctorate. Tertiary education records are based on calendar years, while the employment years are based on tax years. Table 1 below shows how years post study relate to tax years for the 2003 leaving cohort.

Table 1

Aligning years post study with tax years for the 2003 leaving cohort

Year last enrolled in doctoral study	Tax year	Years post study
2003	2004/5	1
2003	2005/6	2
2003	2006/7	3
2003	2007/8	4

2.4 Characteristics of the 2003 leaving cohort

This study focuses on the labour market engagement of a cohort of domestic doctoral graduates who last studied at that level in 2003. The demographic and study-related characteristics of this particular cohort are presented in Table 2. Twenty-nine percent of the cohort were aged 40 and over, with 38 percent aged between 30 and 39 and 33 percent under 30. In terms of gender, a majority of the graduates in the cohort were men (54 percent). Around 76 percent of the cohort indicated they were European, compared with 7 percent for Māori, 2 percent for Pasifika and 15 percent in each of the Asian and Other ethnic groups.

[2] See http://www.stats.govt.nz/browse_for_stats/industry_sectors/anzsic06-industry-classification.aspx for more detail.
[3] See http://www.educationcounts.govt.nz/technical_info/code_sets/new_zealand_standard_classification_of_education_nzsced for more detail.

At the broad New Zealand Standard Classification of Education (NZSCED) level, two fields dominate. These are 'Natural and physical sciences' (34 percent of the cohort) and 'Society and culture' (25 percent of the cohort). The remaining fields are much smaller, with the field of 'Health' (10 percent of the cohort) the next largest.

Table 2

Characteristics of the 2003 leaving cohort

Characteristic	Category	Percent
Age group	Under 30	33
	30-39	38
	40 and over	29
Gender	Women	45
	Men	54
Ethnic group	European	76
	Māori	7
	Pasifika	2
	Asian	15
	Other	15
	Unknown	1
Field of study	Agriculture	4
	Creative arts	2
	Education	6
	Engineering	8
	Health	10
	Information technology	4
	Management & commerce	6
	Natural & physical sciences	34
	Society & culture	25

Note: Due to random rounding to base 3, the percentages of a characteristic may not add to 100%. Ethnic group is reported on a multiple response basis, where the person has been recorded in each ethnic group they identified with.

Source: The data in this table is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

2.5 Comparing the characteristics of the 2003 leaving cohort with the characteristics of those with doctorates in the 2006 Census

This section provides more background context on the 2003 leaving cohort by comparing it with the results of the 2006 Census.[4] Figure 1 compares the field of study of all of the 2003 leaving cohort, those in the 2003 leaving cohort that were employed in New Zealand in 2006, and all doctoral holders in the 2006 Census.[5]

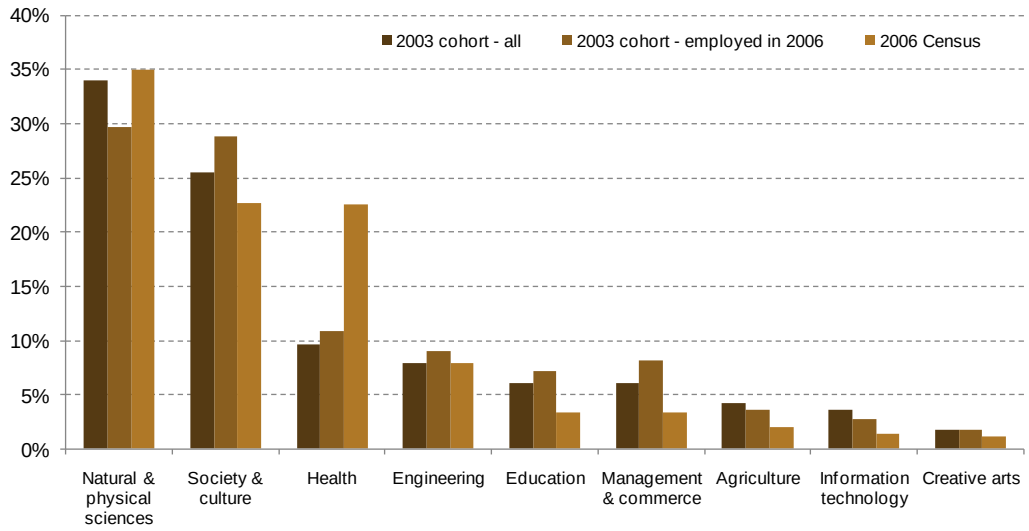
[4] More data on those with doctoral degrees from the 2006 Census is available in Smart (2007): http://www.educationcounts.govt.nz/publications/tertiary_education/tertiary_census_analysis.

[5] It should be noted that there is an element of inconsistency in the coding of NZSCED between Census and the administrative education data used in EOTE.

In all three of these groups, the highest proportion of doctoral graduates studied in the 'Natural and physical sciences'. The main difference between the 2003 leaving cohort members who were in employment in 2006 and the general population in the 2006 Census was in the field of 'Health'. In 2006, 11 percent of the 2003 cohort in employment were from this field of study, compared with 23 percent for all doctoral holders. A possible reason for this difference is the self-reporting nature of the Census, where medical doctors may have reported themselves as having a doctoral degree.

Figure 1

Comparison of the distribution of doctoral graduates in the 2003 leaving cohort with holders of doctorates in the 2006 Census by field of study



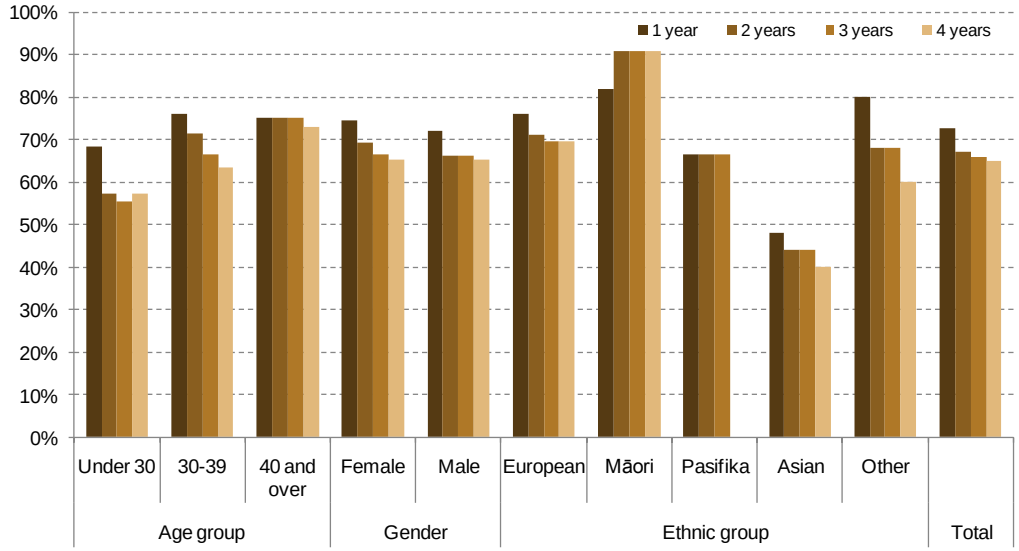
Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand and from the 2006 Census.

3 NEW ZEALAND-BASED EMPLOYMENT RATES

3.1 New Zealand-based employment rate of the 2003 leaving cohort

The New Zealand-based employment rate of the 2003 leaving cohort is presented in Figure 2 by years post study and by demographic characteristics.[6] Overall, around 65 percent of the 495 individuals in the 2003 cohort were in employment in New Zealand four years after they last studied. Although the employment rate fell in each year post study, the most significant fall took place between years one and two post study, where it fell from 73 percent to 67 percent.

Figure 2
New Zealand-based employment rate of the 2003 leaving cohort by years post study and demographic characteristic



Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

When we examine the employment rate of the 2003 cohort by age group, the data shows that older doctoral graduates are more likely to be in employment four years after they last studied. Around 73 percent of the cohort aged 40 or over in their final year of doctoral study were in employment, compared with 63 percent for those aged 30 to 39 and 57 percent for those aged under 30.

A feature of the 40 and over age group was the stability in their employment rate over time. The employment rate for this age group varied between a high of 75 percent one year post study and a low of 73 percent four years after they last studied. It is likely that older doctoral graduates may already be in employment while doing their doctorates, and so are more likely to be employed post study. On the other hand, those in the cohort aged 30 or under exhibited a significant drop in employment rate between one year and two years post study, from 69 percent to 57 percent, at which level it then stabilised. For those aged 30 to 39, there was a relatively steady drop in their rate of employment in each year from a high of 76 percent one year post study to 63 percent four years post study.

Although there was little difference in the employment rate of men and women in the 2003 cohort four years after they last studied – the rate was 65 percent for both men and women –

[6] This analysis of the post-study employment rates of domestic doctoral graduates took place during a time when the New Zealand economy experienced solid growth and was before the onset of the global financial crisis and its associated recession in mid 2008.

there were differences in how their employment rates tracked over time. The employment rate for men dropped significantly between one year and two years post study, from 72 percent to 66 percent, where it stabilised. However, the employment rate for women fell in each year, from 75 percent one year post study to 65 percent four years post study.

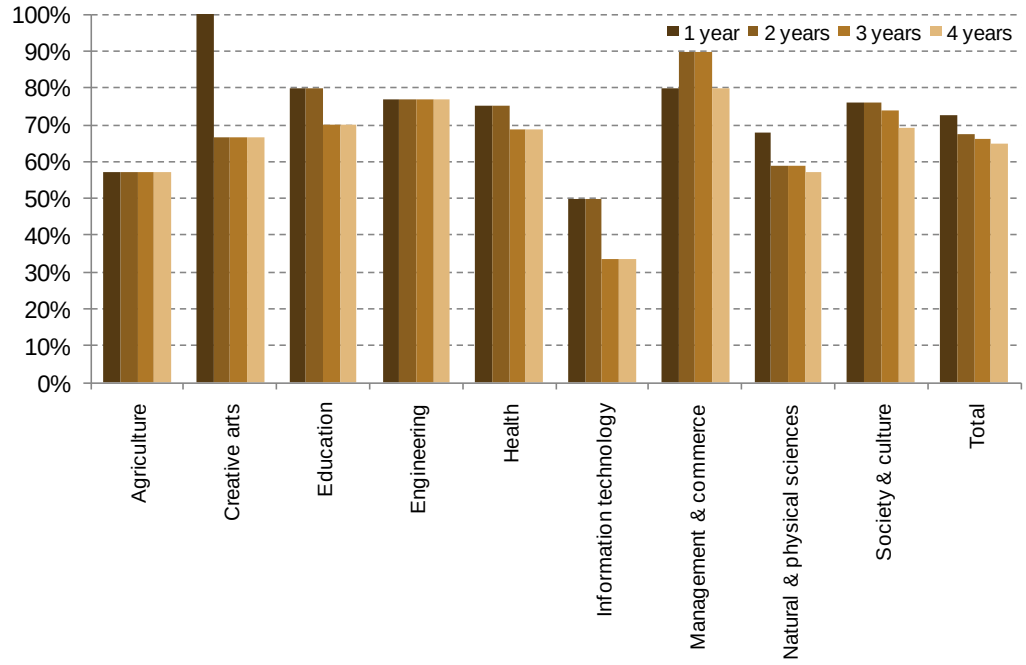
Among ethnic groups, Māori had the highest rate of employment four years after they last studied (91 percent), followed by Europeans (70 percent). However, it is possible that Māori graduates have a lower likelihood of being overseas, and for this reason they have higher New Zealand-based employment rates.[7] Asians were significantly less likely to be in employment after completing doctoral study – just 48 percent of Asians were in employment one year post study. The employment rate of Asians reached 40 percent four years post study. However, Asian graduates tended to be younger than other age groups and more likely to be permanent residents, and were therefore more likely to be overseas. Also, there were few Asian graduates in the field of 'Society and culture', which had the highest domestic employment rates of the larger NZSCED areas.

The New Zealand-based employment rates of the 2003 cohort by broad NZSCED field of study are presented in Figure 3. Graduates in 'Management and commerce' were the most likely to be in employment four years after they last studied (80 percent), with graduates in 'Information technology' the least likely to be in employment (33 percent). Graduates in 'Management and commerce' were predominantly in the 30 to 39 and 40 and over age groups and so were less likely to be overseas and more likely to already be in employment.

Of the two largest fields of study, graduates in 'Natural and physical sciences' had an employment rate of 57 percent four years after they last studied, compared with an employment rate of 69 percent for graduates in the field of 'Society and culture'.

Figure 3

New Zealand-based employment rate of the 2003 leaving cohort by years post study and field of study



Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

[7] This is examined in section 3.5.

Although graduates in the field of 'Creative arts' exhibited a large drop in their employment rate between one and two years post study, the volatility of this change reflects the relatively low numbers in this group. The fall in employment rate between one and two years post study from 68 percent to 59 percent in the field of 'Natural and physical sciences' is much more significant, given the larger size of this group. A likely factor in this trend is the ending of post-doctoral employment at the universities, and the expectation that those with science doctorates gain experience in scientific institutions overseas.

In the two largest broad NZSCED fields, 'Natural and physical sciences' and 'Society and culture', we now examine employment rates at the narrow NZSCED level. In the 'Natural and physical sciences', the highest proportion of graduates in employment four years post study was in the 'Chemical sciences' (71 percent), with the lowest proportion in the 'Mathematical sciences' (50 percent). In 'Society and culture', the highest employment rate four years post study was in the narrow field of 'Studies in human society' (82 percent), while the lowest proportion was in 'Behavioural science' (58 percent).

3.2 Comparing the New Zealand-based employment rate of doctoral graduates with bachelors and masters graduates

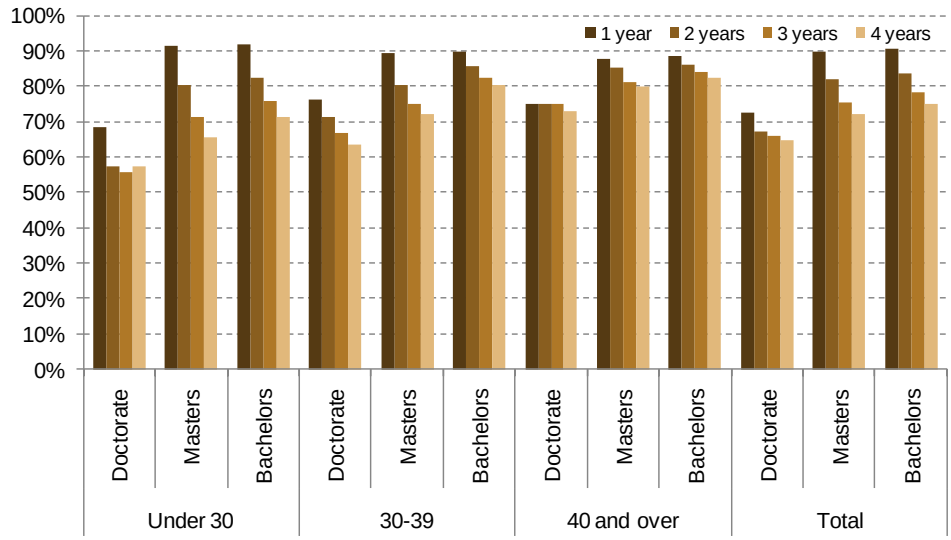
Given the limited opportunities in some specialised areas, it would be expected that doctoral graduates have a lower rate of engagement with the New Zealand labour market and they may be more likely to seek employment overseas. The data in Figure 4 suggests this is the case, with the New Zealand-based employment rate for doctoral graduates four years after they last studied (65 percent) lower than masters graduates (72 percent) and bachelors graduates (75 percent).

Overall, the employment rate for masters and bachelors graduates declined more quickly over time than for doctoral students. There was an eight percentage point fall in the employment rate for doctoral graduates, from 73 percent to 65 percent, between one year and four years post study. This compares with a 17 percentage point fall for masters graduates and a 16 percentage point fall for bachelors graduates.

Examining the New Zealand-based employment rates by age group and qualification level, a number of differences are seen. At the doctoral level, the employment rate for graduates aged under 30 was relatively stable from two years post study, while at the bachelors and masters level they continued to decline. Similarly, in the 40 and over age group, the employment rate of doctoral graduates remained relatively stable over time, while the employment rates for this age group with a bachelors or masters qualification continued to drop in each year post study. The one age group that exhibits a similar pattern over time is the 30 to 39 age group. At each of the three levels of qualification, there was a steady decline in employment rate over time.

Figure 4

New Zealand-based employment rate of 2003 leaving cohort by level of study



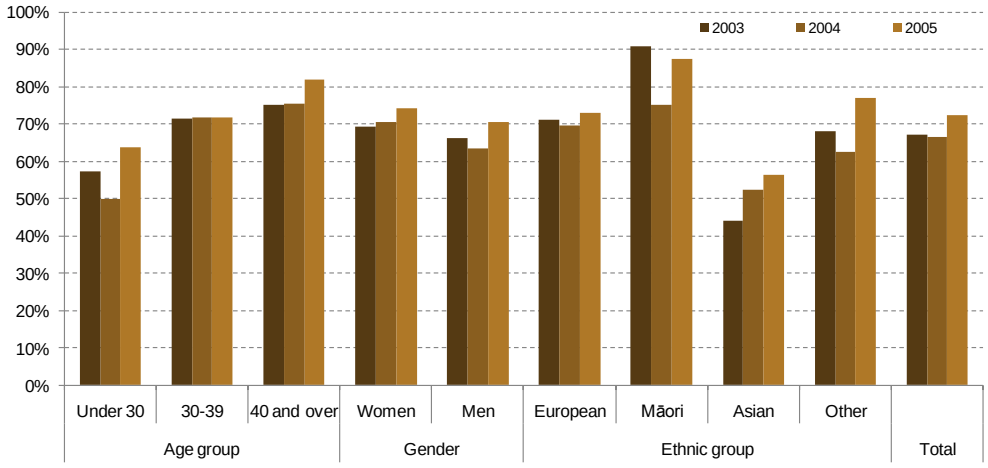
Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

3.3 Two-year post-study employment rates of the 2003, 2004 and 2005 leaving cohorts

This section examines post-study employment rates of three leaving cohorts – 2003, 2004 and 2005 – to assess whether there are significant differences in the employment rates between these cohorts. In other words, how representative of leaving cohorts are the 2003 leavers? Figure 5 shows that in terms of demographic characteristics the employment rates of the three cohorts two years after leaving study were generally stable. Perhaps the most noticeable change in pattern in Figure 5 was the increase in the employment rate for Asian students. So the 2003 cohort that is the focus of this study may represent a low-water mark in employment rate for this ethnic group.

Figure 5

Two-year post-study employment rate by leaving cohort and demographic characteristic

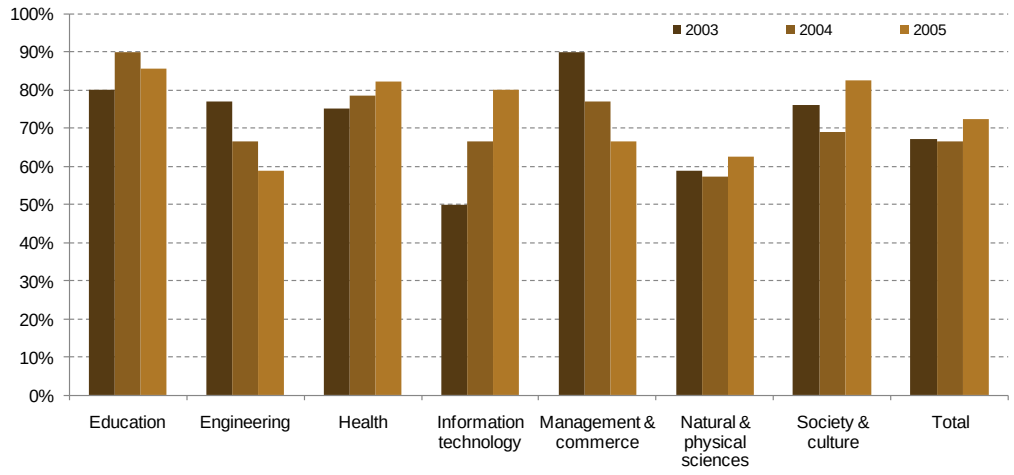


Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

More variation was exhibited in the employment rates of the three leaving cohorts by broad field of study. To an extent, this reflects small numbers in most of the fields – such as 'Engineering' and 'Information technology'. In the larger fields of study, the employment rate for graduates in 'Natural and physical sciences' was slightly higher for the 2005 cohort compared with the 2003 cohort. Similarly, the 2005 cohort in 'Society and culture' exhibited a higher two-year post-study employment rate compared with 2003.

Figure 6

Two-year post-study employment rate by leaving cohort and field of study



Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

3.4 Employment pathways

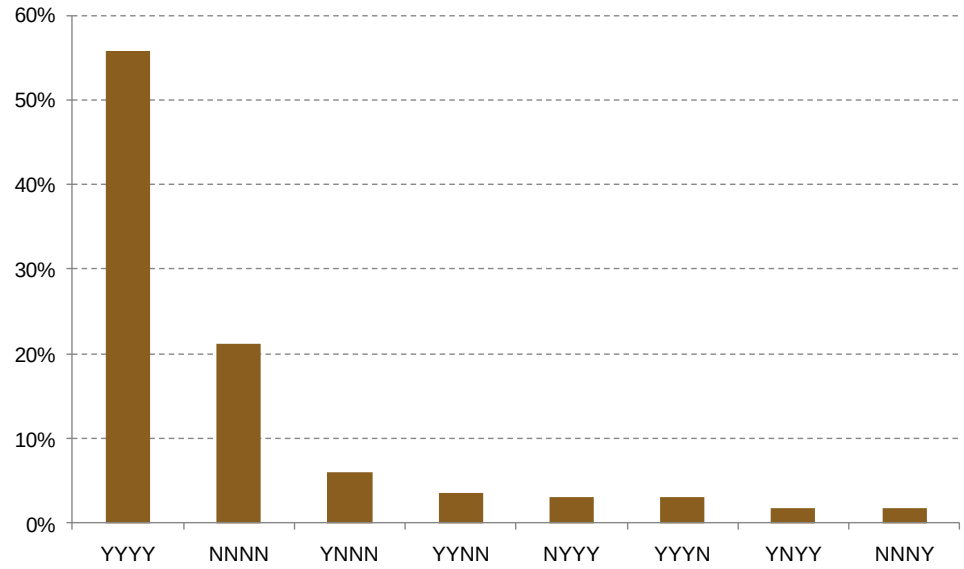
The analysis so far has examined the overall employment rate of graduates in a particular year post study. This section explores the sequential engagement of individuals with the labour market over the four years post study. This allows us to examine how many of the 2003 leaving cohort were in employment in New Zealand in all four years post study as well as other combinations of employment and non-employment.

Figure 7 shows that the majority of the 2003 leaving cohort members (56 percent) were in employment in each of the four years post study. The second largest group (21 percent) was those who were not in employment in any of the four years post study. The next most common outcome was for people to leave employment in the second year post study and did not return (6 percent of the cohort), followed by people who left employment in the third year post-study and did not return to employment (4 percent of the cohort).

There was a small proportion of the cohort members who were not in employment initially post study but then returned to employment in subsequent years. Around 5 percent of the cohort were not initially in employment after study but then became employed in either the second or third year post study.

Figure 7

Sequential engagement of the 2003 leaving cohort with the labour market by year after study



Note: A Y indicates the person was in employment in that year. The sequence indicates whether they were in employment 1 year, 2 years, 3 years and 4 years post study. For example, the YYYY category indicates that these graduates were in employment in each year following study.

Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

3.5 Estimating what proportion of the 2003 cohort may be overseas

A limitation of the dataset used in this study is that it cannot identify if graduates were overseas. However, we can use data from the 2006 Census to make an estimate of what this proportion may have been. To do this, we apply the ratio of employed to not employed, as measured in the 2006 Census, to the 2003 cohort data. The assumption is that the 2003 leaving cohort exhibits the same characteristics as all doctoral holders in New Zealand. This gives an estimate of the proportion of the 2003 leaving cohort members who were resident in New Zealand but not in employment. From that, plus the employment rate, we can deduce the proportion overseas.

Table 3 presents the working to obtain the estimates of people overseas. Row a shows the employment rate by age group of the 2003 leavers, while row b presents the employment rate of New Zealand residents in the 2006 Census. To estimate the proportion of the 2003 cohort that is in New Zealand, we multiply the inverse of the 2006 Census employment rate by the employment rate of the 2003 cohort. This shows that around 74 percent of the 2003 cohort members were estimated to be in New Zealand (see row d). Therefore, around 26 percent of the 2003 cohort was estimated to be overseas (see row f), if they follow the same employment patterns as exhibited by all doctoral holders in the 2006 Census.

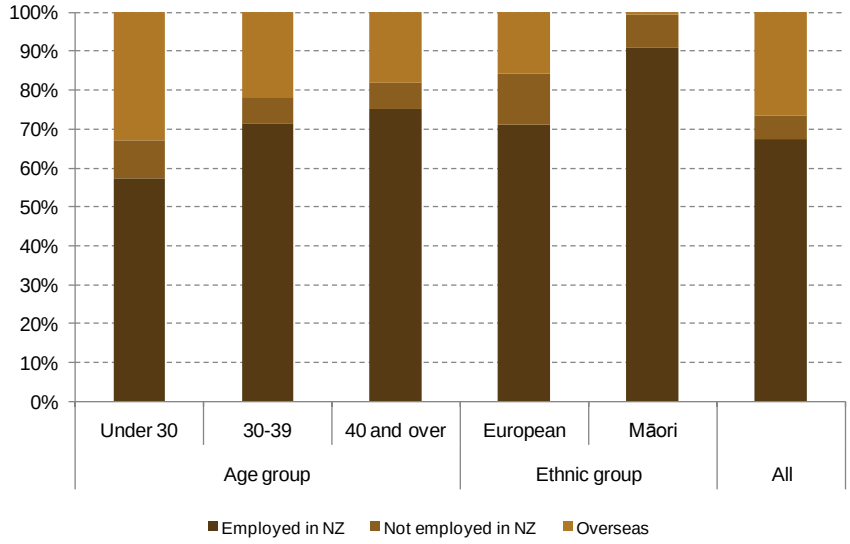
Table 3
Estimated proportion of 2003 leaving cohort overseas in 2006 by age group and ethnic group

			Age group			Ethnic group		
Row	**Measure**	**Source**	**Under 30**	**30-39**	**40 and over**	**European**	**Māori**	**All**
a	Employment rate of 2003 leaving cohort	EOTE	57%	71%	75%	71%	91%	67%
b	Employment rate for people with doctoral degrees in 2006 Census	Census	86%	91%	92%	84%	91%	91%
c	Ratio to calculate % of 2003 leaving cohort in New Zealand = 1 / row b		1.167	1.093	1.091	1.184	1.093	1.093
d	Estimated % of 2003 leaving cohort in New Zealand = row a x row c		67%	78%	82%	84%	99%	74%
e	Estimated % of 2003 leaving cohort not employed but in New Zealand = row d - row a		10%	7%	7%	13%	8%	6%
f	Estimated % of 2003 leaving cohort overseas = 100% - row d		33%	22%	18%	16%	1%	26%

Source: The data in row a is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

Figure 8 illustrates the estimated proportions of the 2003 cohort that were in employment in New Zealand, those that were not in employment in New Zealand and those estimated as being overseas. Although the employment rates were lower for younger members of the 2003 leaving cohort, it would appear that at least part of the reason is a higher likelihood of their being overseas. It was estimated that around a third of graduates in the under 30 age group were likely to be overseas two years after leaving study. This is not surprising, in that younger doctoral graduates are more likely to seek out post-doctoral positions overseas, because of the limited number of these positions available in New Zealand. Overall, around 26 percent of the cohort was estimated to be overseas, compared with 33 percent of those aged under 30, 22 percent of those aged 30 to 39, and 18 percent of those aged 40 and over.

Figure 8
Estimated two-year post-study outcomes for the 2003 leaving cohort



Note: The proportions of graduates not in employment in New Zealand and those who were overseas are estimates.

Source: The 'Employed in NZ' data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

In terms of ethnic group, although the New Zealand-based employment rate for Māori is much higher than for Europeans in the 2003 cohort, the probable reason for this is that Māori graduates are much less likely to be overseas. Just 1 percent of the cohort members who are Māori were estimated to be overseas compared with 16 percent of Europeans.

3.6 International comparisons of post-study employment rates

In this section, survey data from Canada and the United Kingdom that tracks graduate outcomes around the same period of time as the New Zealand 2003 leaving cohort is used to assess whether the employment rates of New Zealand doctoral graduates are in line with those in other countries. Choosing a similar time frame for the analysis is important, as the comparison needs to take place in a similar economic environment.

A survey of Canadian doctoral graduates who completed their studies in 2005 (Desjardins & King 2011) showed that around 86 percent of the members of this cohort were employed in 2007. However, this includes graduates that were employed in the United States. If you remove this group from the figures, the employment rate of graduates living in Canada was around 75 percent. This compares with the employment rate of 73 percent for the New Zealand 2003 leaving cohort one year post study and 67 percent two years post study.[8]

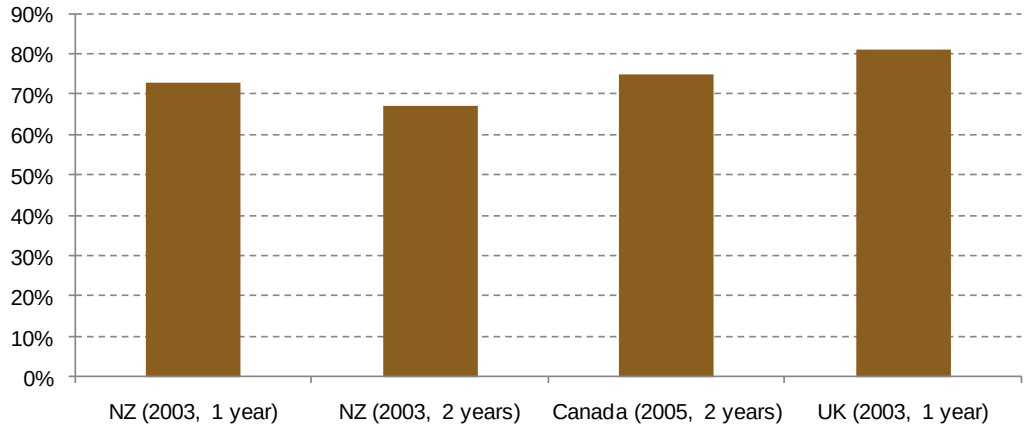
In the United Kingdom, a longitudinal survey (Haynes et al 2009) showed that the one-year post-study employment rate of doctoral graduates who last studied in 2003 and were working in the United Kingdom was around 81 percent. This compares with the one-year post-study employment rate of 73 percent for New Zealand doctoral graduates from the 2003 leaving cohort.

As shown in Figure 9, the data suggests that the employment rate of doctoral graduates in their domestic labour market was slightly lower in New Zealand than in Canada. Although the employment rate of graduates in the United Kingdom was clearly higher than in New Zealand, this may reflect the greater domestic employment opportunities for doctoral graduates in the United Kingdom. Figures from the United Kingdom (Haynes et al 2009) suggest that around 8 percent of their domestic doctoral graduates were overseas one year after completing their study. Given the estimated figure of 26 percent for New Zealand doctoral graduates being overseas in Figure 8, it would suggest that the lower employment rates for New Zealand doctoral graduates in their domestic labour markets is a reflection of the higher likelihood of the New Zealand graduates being overseas.

[8] The reason for including the one and two years post-study employment rates for New Zealand is that they are based on tax years. So the one-year post-study rate actually refers to employment between April 2004 and March 2005 and the two-year rate refers to employment between April 2005 and March 2006. Depending on the timing of the Canadian survey, the one-year or two-year employment rates might be more appropriate.

Figure 9

Post-study employment rate of doctoral graduates in home country



Note: The number in parentheses indicates the year the cohort last studied and the number of years post study the employment rate refers to.

Source: The New Zealand data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand. The source of the Canadian data is Desjardins & King (2011) and the source of the United Kingdom data is Haynes et al (2009).

3.7 New Zealand-based employment rate of international doctoral graduates

Although the main focus of this study is on the post-study employment rates of domestic graduates, in this section we examine the post-study employment rates of international students who last studied at the doctoral level in 2003. Of the 60 non-New Zealand residents who last studied at doctoral level in 2003 and who completed their doctorate, around 25 percent were in employment in New Zealand four years after they last studied.

So although we lose some New Zealand domestic doctoral graduates overseas, some of the loss is offset by international students staying on after their studies. The number of international graduates in the 2003 cohort was relatively small. However, from 2005, new international doctoral students have been treated as domestic in terms of government funding and this policy has led to a significant increase in the number of international students studying at the doctorate level. Since then, enrolments in doctoral degrees by international students have increased by around 300 percent.

4 INDUSTRY OF EMPLOYMENT

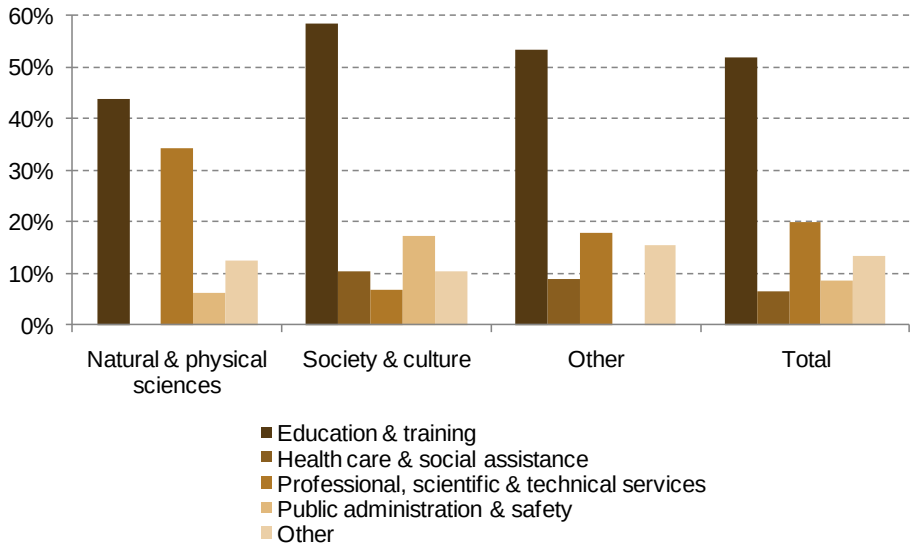
4.1 Industry of employment for the 2003 leaving cohort

In this section, we examine the industry of employment of the 2003 leavers four years after they last studied.[9] The industry groupings are based on the 2006 Australian and New Zealand Standard Industrial Classification (ANZSIC06). Figure 10 shows the distribution of those in employment by industry and by field of study. Overall, the largest proportion of the 2003 leaving cohort was employed in the broad industry of 'Education and training' (52 percent), with the next largest industry of employment being 'Professional, scientific and technical services' (20 percent).

The industry distribution of employed graduates varied among the broad fields of study. As one might expect, a higher proportion of graduates who studied 'Natural and physical sciences' was employed in 'Professional, scientific and technical services' (34 percent), compared with 'Society and culture' (7 percent) and 'Other' (18 percent). Also, graduates from 'Society and culture' had a higher proportion employed in 'Education and training' (59 percent) and 'Public administration and safety' (17 percent) than the other two fields of study.

Figure 10

Distribution of industry of employment four years post study by field of study



Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

Figure 11 presents the numbers employed in two sub-industries of interest – 'Tertiary education' and 'Scientific research services'. We are interested in the 'Tertiary education' grouping as this indicates the degree of utilisation of the new doctoral resource by the tertiary education system. Similarly, the interest in the 'Scientific research services' area is to assess the take-up of the graduates in the scientific research community outside of the tertiary education area.

The numbers of the 2003 leaving cohort employed in 'Tertiary education' exhibit a gradual drop over time from 189 one year post study to 150 four years post study. The initial drop between year one and year two post study is likely to partly reflect the ending of post-doctoral

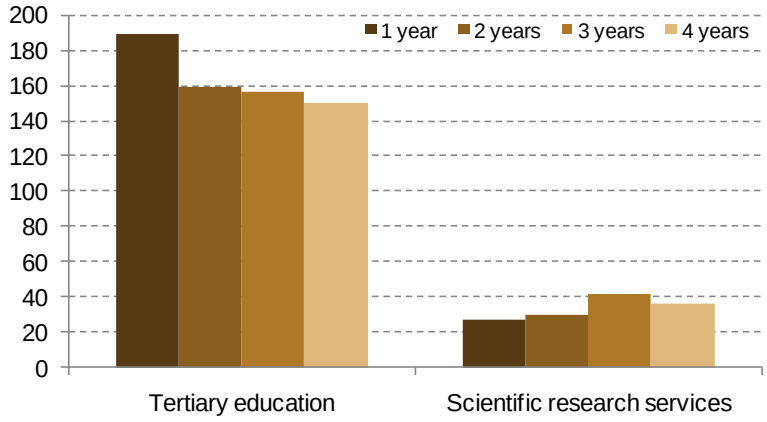
[9] Note that the industry reported in this analysis is the 'main' industry of employment. In other words, where an individual was employed in two or more industries in a year, the industry with the highest earnings is the one reported.

employment at the universities. It may also reflect new doctoral graduates doing some university teaching/research on a casual basis while job seeking for a permanent position. After year two, the drop in numbers employed is much lower.

In contrast, the number of doctoral graduates from the 2003 cohort employed in the industry of 'Scientific research services' increased in each of the first three years post study, before a slight decline in the fourth year post study.

Figure 11

Numbers employed by selected narrow industry and year post study

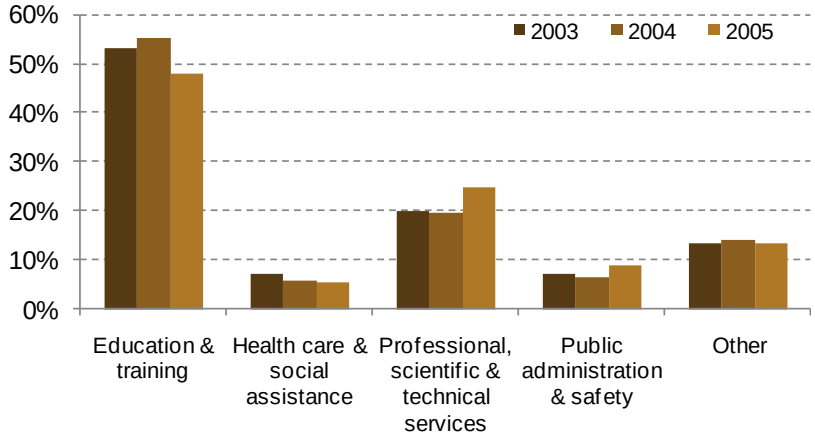


Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

In Figure 12, we examine the two-year post-study industry destinations of three leaving cohorts – 2003, 2004 and 2005 – to assess whether there is a significant difference in the industry of employment between these cohorts. Broadly speaking, the two-year post-study industry distribution was similar in the three leaving year cohorts, although the 2005 leaving cohort displayed a slightly lower share in 'Education and training' and higher share in 'Professional, scientific and technical services'.

Figure 12

Distribution of industry of employment two years post study by leaving cohort

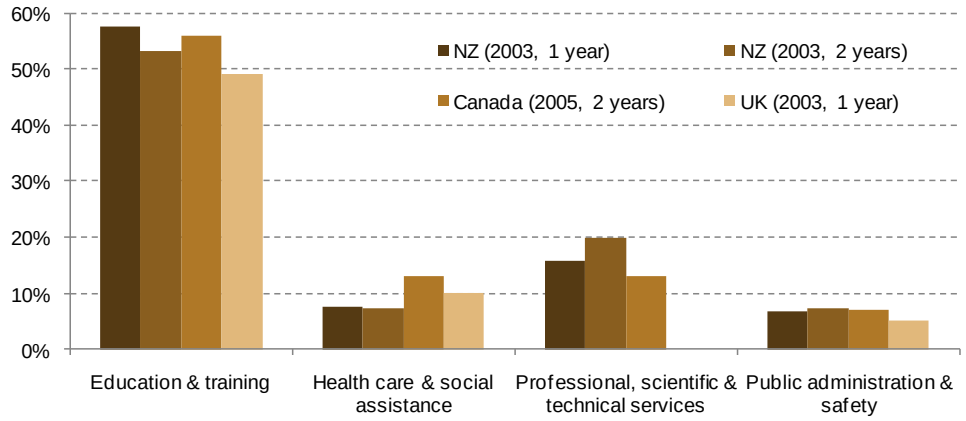


Source: This data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

4.2 International comparison of industry destination

The distribution of industry of doctoral graduates two years post study in Canada and the United Kingdom is compared with the 2003 leaving cohort in Figure 13. This shows broadly similar patterns of industry distribution among the three countries. Canada and New Zealand in particular have a similar industry of employment profile – there is a high proportion employed in the 'Education and training', a lower proportion of graduates employed in 'Health' and a higher proportion in 'Professional and technical services'.

Figure 13
Distribution of industry of employment by country



Note: The number in parentheses indicates the year the cohort last studied and the number of years post study the employment rate refers to.

Source: The New Zealand data is based on figures extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand. The source of the Canadian data is Desjardins & King (2011) and the source of the United Kingdom data is Haynes et al (2009).

5 CONCLUSION

Although there is a clear earnings premium for those who attain a doctoral degree, the specialised nature of a doctoral degree means that there will always be a tension between the limited opportunities for graduates in New Zealand and the reality that sometimes graduates will seek out opportunities overseas. This is especially the case for a country like New Zealand, with a limited number of specialised research positions. The lower domestic employment rate of the 2003 cohort, compared with those with bachelors and masters degrees, appears to bear this out. Similarly, the lower employment rate of New Zealand doctoral graduates in their domestic labour market compared with those in Canada and the United Kingdom would appear to reflect the higher proportion of New Zealand doctoral graduates overseas.

In terms of the demographic characteristics of the New Zealand 2003 leaving cohort, the most significant differences in employment rates were between age groups and ethnic groups. That younger members of the 2003 cohort were less likely to be in employment in New Zealand was not surprising as this group is more likely to be overseas seeking employment opportunities. However, the lower employment rate for Asians was particularly noticeable. A factor in this result was that few Asians graduated with doctorates in the fields with high employment rates, such as 'Society and culture'. In addition, Asian graduates are more likely to be permanent residents and so more likely to be overseas than New Zealand citizens. Also, the employment rate of this ethnic group in later leaving cohorts was rising, so the 2003 result may have represented a low-water mark.

By field of study, graduates from 'Natural and physical sciences' had the lowest rate of employment, while graduates from 'Society and culture' had the highest. Once again, this may reflect the limited employment opportunities for science researchers in New Zealand.

Although New Zealand may lose a proportion of domestic doctoral graduates overseas, the time period in this study is not long enough to know how long these people are likely to be lost to the New Zealand labour market. Also, although the number of international doctoral graduates was relatively low in this study, there is evidence that a sizeable proportion of these graduates stayed on in New Zealand in employment after study. So this would offset some of the loss of New Zealand domestic graduates.

Although this study assessed employment rates of New Zealand's doctoral graduates in the domestic labour market, a fuller understanding of the value of doctoral graduates would require information on how many are overseas. Statistics New Zealand has plans to add data from the New Zealand Customs Service on border crossings to the employment and education data. This addition will allow for future analysis to identify who is overseas, which will then allow for a more robust analysis of the utilisation of new doctoral graduates in New Zealand.

APPENDIX A DATA TABLES

Table 4

Employment rate of the 2003 leaving cohort by years post study

Characteristic	Category	Number in 2003 cohort	Employment rate by years post study			
			1 year	2 years	3 years	4 years
Age group	Under 30	162	69%	57%	56%	57%
	30-39	189	76%	71%	67%	63%
	40 and over	144	75%	75%	75%	73%
Gender	Female	225	75%	69%	67%	65%
	Male	267	72%	66%	66%	65%
Ethnic group	European	375	76%	71%	70%	70%
	Māori	33	82%	91%	91%	91%
	Pasifika	9	67%	67%	67%	C
	Asian	75	48%	44%	44%	40%
	Other	75	80%	68%	68%	60%
	Unknown	6	0%	0%	0%	0%
Field of study	Agriculture, environmental & related studies	21	57%	57%	57%	57%
	Architecture & building	C	C	C	C	C
	Creative arts	9	100%	67%	67%	67%
	Education	30	80%	80%	70%	70%
	Curriculum & education studies	27	78%	78%	78%	67%
	Engineering & related technologies	39	77%	77%	77%	77%
	Health	48	75%	75%	69%	69%
	Information technology	18	50%	50%	33%	33%
	Management & commerce	30	80%	90%	90%	80%
	Business & management	18	67%	83%	83%	67%
	Natural & physical sciences	168	68%	59%	59%	57%
	Biological sciences	90	63%	60%	60%	60%
	Chemical sciences	21	86%	86%	86%	71%
	Earth sciences	15	60%	60%	60%	60%
	Mathematical sciences	18	67%	67%	33%	50%
	Physics & astronomy	15	80%	40%	40%	60%
	Society & culture	126	76%	76%	74%	69%
	Behavioural science	36	75%	58%	58%	58%
	Language & literature	24	63%	75%	50%	63%
	Philosophy & religious studies	18	67%	83%	67%	67%
	Studies in human society	33	73%	73%	82%	82%
Total		495	73%	67%	66%	65%

Note: All counts in these tables have been randomly rounded to base 3. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells.

Source: Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

Table 5

Employment rate of the 2003 leaving cohort by years post study, gender and field of study

Gender	Age group	Field of study (NZSCED)	Number in 2003 cohort	Employment rate by years post study			
				1 year	2 years	3 years	4 years
Female	under 30	Natural & physical sciences	33	73%	55%	55%	64%
		Society & culture	15	80%	60%	60%	60%
		Other	21	57%	57%	43%	43%
	30-39	Natural & physical sciences	30	70%	70%	60%	50%
		Society & culture	24	75%	88%	75%	75%
		Other	30	70%	60%	60%	60%
	40 and over	Natural & physical sciences	9	67%	100%	100%	67%
		Society & culture	27	89%	89%	89%	89%
		Other	36	67%	67%	75%	67%
Male	under 30	Natural & physical sciences	48	69%	50%	56%	56%
		Society & culture	15	60%	80%	60%	60%
		Other	30	70%	60%	60%	60%
	30-39	Natural & physical sciences	36	75%	67%	67%	58%
		Society & culture	27	67%	67%	67%	67%
		Other	45	87%	80%	80%	80%
	40 and over	Natural & physical sciences	6	0%	0%	0%	100%
		Society & culture	21	57%	71%	57%	57%
		Other	45	73%	73%	67%	73%
Total			495	73%	67%	66%	65%

Note: All counts in these tables have been randomly rounded to base 3. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells.

Source: Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

Table 6

Employment rates of the 2003 cohort by years post study and level of qualification

Age group	Qualification level	Employment rate by years post study			
		1 year	2 years	3 years	4 years
Under 30	Doctorate	69%	57%	56%	57%
	Masters	91%	80%	71%	66%
	Bachelors	92%	83%	76%	71%
30-39	Doctorate	76%	71%	67%	63%
	Masters	90%	81%	75%	72%
	Bachelors	90%	86%	82%	80%
40 and over	Doctorate	75%	75%	75%	73%
	Masters	88%	85%	81%	80%
	Bachelors	88%	86%	84%	82%
Total	Doctorate	73%	67%	66%	65%
	Masters	90%	82%	76%	72%
	Bachelors	91%	84%	78%	75%

Note: All percentages in this table are based on counts that have been randomly rounded to base 3. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells.

Source: Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

Table 7

Two-year post-study employment rates by leaving cohort

Characteristic	Category	Sub-category	Leaving cohort		
			2003	2004	2005
Age group	Under 30		57%	50%	64%
	30-39		71%	72%	72%
	40 and over		75%	75%	82%
Gender	Women		69%	71%	74%
	Men		66%	63%	71%
Ethnic group	European		71%	70%	73%
	Māori		91%	75%	88%
	Pasifika		67%	C	C
	Asian		44%	52%	57%
	Other		68%	63%	77%
	Unknown		0%	67%	C
Field of study	Agriculture, environmental & related studies		57%	C	C
	Architecture & building		C	0%	C
	Creative arts		67%	C	80%
	Education		80%	90%	86%
		Curriculum & education studies	78%	88%	89%
	Engineering & related technologies		77%	67%	59%
	Health		75%	79%	82%
	Information technology		50%	67%	80%
	Management & commerce		90%	77%	67%
		Business &management	83%	57%	67%
	Natural & physical sciences		59%	57%	63%
		Biological sciences	60%	58%	64%
		Chemical sciences	86%	67%	70%
		Earth sciences	60%	60%	50%
		Mathematical sciences	67%	75%	C
		Physics &astronomy	40%	40%	40%
	Society & culture		76%	69%	83%
		Behavioural science	58%	70%	71%
		Language & literature	75%	44%	100%
		Philosophy & religious studies	83%	C	C
		Studies in human society	73%	90%	89%
Total			67%	66%	72%

Note: All percentages in this table are based on counts that have been randomly rounded to base 3. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells.

Source: Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

Table 8

Number of 2003 leaving cohort in employment by industry and years post study

Division/Group	Years post study			
	1 year	2 years	3 years	4 years
Education & training	207	177	168	165
Tertiary education	189	159	156	150
Health care & social assistance	27	24	24	21
Professional, scientific & technical services	57	66	66	63
Scientific research services	27	30	42	36
Public administration & safety	24	24	27	27
Other	51	45	39	42
Total	360	333	324	318

Note: All counts in these tables have been randomly rounded to base 3. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells.

Source: Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

Table 9

Distribution of industry of employment by leaving cohort

Division	Leaving cohort		
	2003	2004	2005
Education & training	53%	55%	48%
Health care & social assistance	7%	6%	5%
Professional, scientific & technical services	20%	20%	25%
Public administration & safety	7%	7%	9%
Other	14%	14%	13%

Note: All percentages in this table are based on counts that have been randomly rounded to base 3. Cells containing counts of less than 6 are rounded to zero. Rounding will cause loss of data in sparsely populated cells.

Source: Figures have been extracted from the Employment Outcomes of Tertiary Education Feasibility Dataset managed by Statistics New Zealand.

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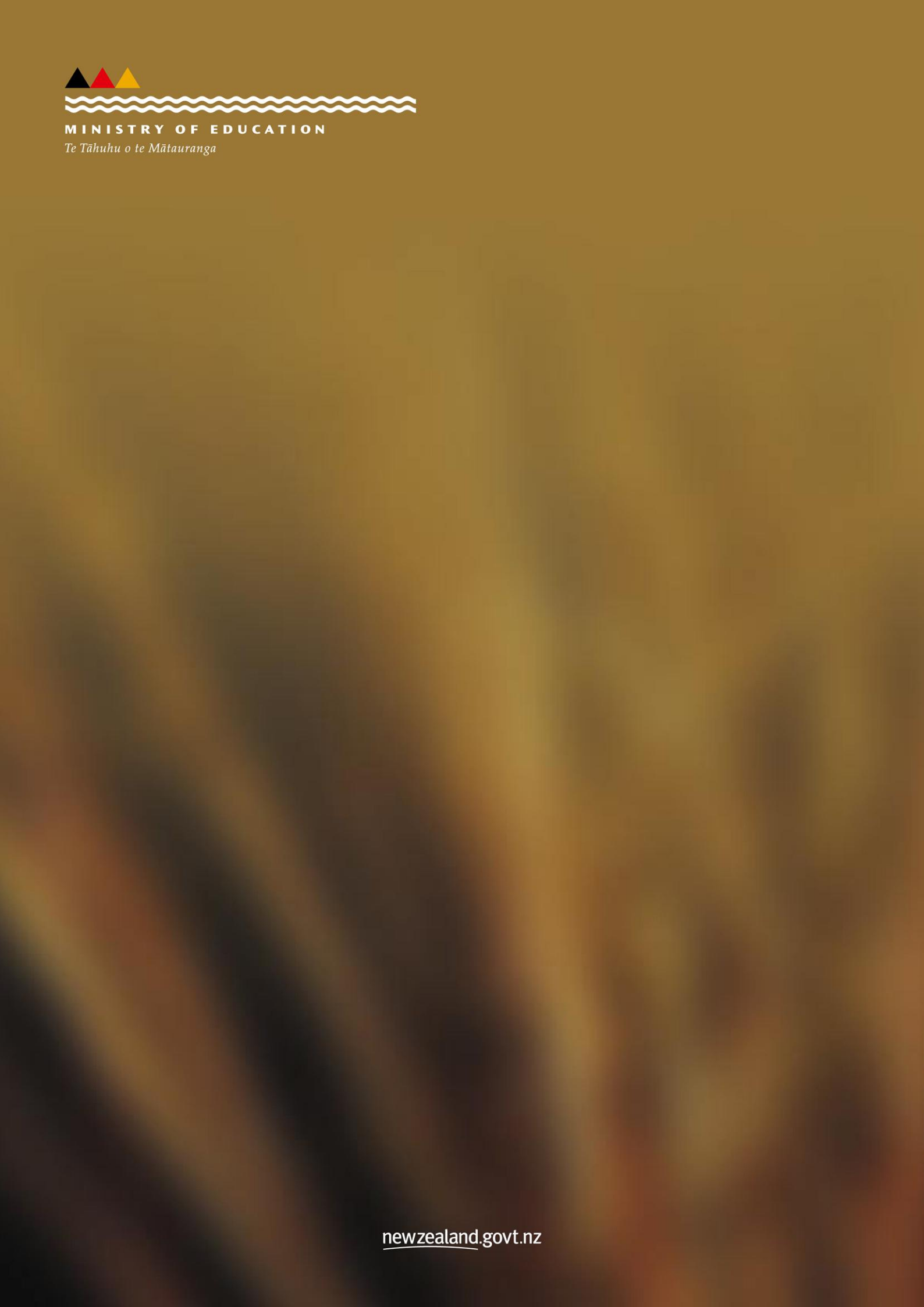

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