

Who Left, Who Returned and Who Was Still Away?

Migration patterns of 2003
graduates, 2004 – 2010



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This report was undertaken while the author was on secondment to Statistics New Zealand. The results in this report are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI) prototype managed by Statistics NZ. On-going work within Statistics NZ to develop the IDI means it will not be possible to exactly reproduce the data presented here.

Access to the data used in this study was provided by Statistics NZ in accordance with 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, business or organisation. The results in this report have been confidentialised to protect individual people and businesses from identification.

Careful consideration has been given to the privacy, security and confidentiality issues associated with using administrative data in the IDI prototype. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz.

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

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

EXECUTIVE SUMMARY

Purpose and key question

This report presents new research on the extent that domestic graduates from tertiary education institutes (TEIs) leave, and then return to, New Zealand. It examines the migration patterns through to 2010, of New Zealand students who completed a tertiary qualification in 2003. We exclude international students and those domestic students who spent an extended period overseas using a non-New Zealand passport before study.

This research improves our understanding of the extent that graduates from TEIs are attracted overseas and therefore do not contribute, at least initially, to New Zealand's stock of human capital. Of particular interest is improving our knowledge of which type of graduate is more likely to leave New Zealand permanently.

Main findings

Table 1 summarises our key results in terms of which 2003 graduates left New Zealand, which returned and which were still away at the end of the study period. These results control for the differences between graduates that we could observe, such as age.

More than a quarter (25.9 percent) of 2003 domestic tertiary graduates left New Zealand between 2004 and 2010 for a year or more. Of those who left in 2004 or 2005, around a quarter (25.6 percent) returned to New Zealand four years later. Of all 2003 graduates, 15.1 percent were abroad in 2010 and had been abroad for at least three years.

Table 1: Summary of main results, by level of qualification

Level of study	Number of graduates	% of all graduates who left ¹	% of leaving graduates who returned ²	% of all graduates that were still away ³
Level 1–3 certificates	14,010	18.7	23.6	10.6
Level 4 certificates	5,316	22.0	24.3	12.6
Level 5–7 diplomas	4,755	23.4	31.8	12.5
Level 7 bachelors/grad	11,673	30.7	26.5	17.6
Level 8 honours/postgrad	3,048	35.3	22.7	21.9
Level 9 masters	1,467	34.3	22.3	21.3
Level 10 doctorate	354	48.1	16.7	34.9
All levels	40,623	25.9	25.6	15.1

Notes: Figures have been extracted from the IDI prototype managed by Statistics NZ. They have been adjusted to take account of differences between graduates in terms of age, young completer status, sex, ethnicity, leaving student loan amount; return rates were also adjusted for whether the plane disembarked in Australia or not. (1) Of all 2003 graduates, the proportion that left New Zealand between 2004 and 2010. (2) Of all 2003 graduates that left in 2004 or 2005, the proportion that were back in New Zealand in years four and five after leaving. (3) Of all 2003 graduates, the proportion that were abroad in 2010 and had been abroad since at least 2008.

Level of qualification

The likelihood that a 2003 graduate left New Zealand over the following seven years is strongly associated with the level of their qualification. The probability of leaving increases with level, from 18.7 percent for those graduating with a level 1–3 certificate to 48.1 percent of those graduating with a doctorate.

The relationship between qualification level and the likelihood of return after four years was weaker. This may be partly due to data limitations, primarily not being able to observe graduate migration patterns beyond 2010. From what we could observe, the probability of return was above average for those with level 5–7 diplomas and below average for those with doctorates.

The proportion of 2003 graduates who were abroad in 2010, and had been for at least three years, is strongly related to level, even after controlling for other differences between graduates that we could observe. The proportion of graduates who were abroad, through 2008 to 2010, increases from 10.6 percent for those with level 1–3 certificates to over one third of those with doctorates.

Graduates in bachelor and postgraduate qualifications tended to go overseas straight after graduation or after a few years in the workforce. In comparison, graduates in lower level qualifications tended to leave at a more consistent rate over the seven year period. In doing so they are behaving more like the overall New Zealand population.

Field of study

There was not much variation by field of study (after controlling for other differences) in the proportion of 2003 graduates abroad through 2008–10 especially for those with a level 1–3 certificate or a level 4–7 certificate or diploma. There was more variation for those graduates with bachelors or postgraduate qualifications, with graduates in architecture and building being more likely to be abroad through 2008–10, and graduates in agriculture, environmental and related studies being less likely to be abroad. Those with bachelors degrees in education were also less likely to be abroad.

Looking at a more detailed breakdown of qualifications (without controlling for other differences), there were some qualifications where between a third and 40 percent of 2003 graduates were abroad through 2008–10, many in science, technology, engineering and mathematics (STEM). A number of these specialised qualifications were held by small numbers of graduates, which means that we cannot be confident that future graduates in these qualifications will be abroad at similar rates.

Other characteristics

There are other characteristics that affect the migration patterns of graduates, even after controlling for other differences. The likelihood of being abroad decreases with age, with those aged between 20 and 24 years when completing their qualification being more likely to be abroad seven years later than any other

age group. Being female significantly reduced the probability of being abroad through 2008–10, although the effect was relatively small. Asians and those in the 'Other' ethnic group were significantly more likely to be abroad than Europeans. The student loan balance at the time of graduation was positively associated with the likelihood of being abroad, although this effect was relatively small.

We could not identify the final destination for departures from New Zealand, only where their plane had landed. We simplified this information into an 'Australia' or 'rest of the world' variable. Although this is limiting, this variable still had a large association with the probability of returning to New Zealand. Departing graduates whose plane landed in Australia were significantly less likely to return to New Zealand after four years than those whose plane landed elsewhere. We would expect this type of effect given that it is easier for New Zealanders to stay for extended periods in Australia than other countries.

Around 60 percent of graduate departures landed in Australia, compared to 70 percent of all New Zealand departures aged 17 to 59 years. Across all age groups, with the exception of the 17–20 year olds, graduate departures were less likely to land in Australia than New Zealand departures in general. The likelihood of graduate departures leaving for Australia generally decreases with the level of their qualification, from 79 percent for level 1–3 certificates to 42 percent for doctorates.

Data sources

The study was made possible by the availability of linked education and migration data that is part of Statistics New Zealand's prototype Integrated Data Infrastructure. The data was accessed under conditions that meet the stringent protections of the Statistics Act and the Tax Administration Act. A detailed disclaimer is included in the paper.

CONTENTS

EXECUTIVE SUMMARY	IV
CONTENTS.....	VII
1 INTRODUCTION	1
2 WHAT DO WE ALREADY KNOW?	2
2.1 Official statistics on PLT migration	2
2.2 The database on immigrants in OECD countries	3
2.3 Australian and New Zealand census data.....	4
2.4 Longitudinal cohort studies.....	4
2.5 Prior work using integrated administrative data	5
2.6 Summary	6
3 DATA.....	8
3.1 Data source.....	8
3.2 Population.....	9
3.3 Defining extended periods out of New Zealand.....	10
4 DESCRIPTIVE RESULTS	13
4.1 How do the different student populations compare?.....	13
4.2 How does our method compare with that used for official statistics?	18
4.3 Who is more likely to leave after completing study?.....	19
4.4 Who is more likely to return from abroad?.....	20
4.5 Who is more likely to be still away?	23
5 REGRESSION ANALYSIS	25
5.1 Level of qualification.....	25
5.2 Field of study.....	28
5.3 Other characteristics	31
6 CONCLUSION.....	33
REFERENCES.....	37
TABLES.....	38

1 INTRODUCTION

New Zealand's stock of human capital is significantly affected by migration flows - more so than almost any other developed country. Our emigrants and immigrants make up a relatively large proportion of the New Zealand population, and they both tend to be more skilled than the resident, New Zealand born, population.

Historically, many of those that depart our country have been recent tertiary students. Travelling abroad after study on an Overseas Experience (OE) has long been a part of our culture and recent decades have seen increased migration by young people to Australia.

Understanding this behaviour is important when thinking about what types of tertiary education we should fund and how we should set immigration policy. In particular, it will be useful for policymakers to understand:

- What type of tertiary students leave New Zealand after study?
- What factors seem to influence their decision?
- What proportion of these graduates return? When do they return? What are the main drivers in their decisions to return or not?
- Overall, are there certain types of skills that are generated by our education and training system that we tend to lose through emigration?
- How well do our immigration settings replace the skills that we lose overseas?

These questions have been difficult to answer due to a lack of information. Thanks to the recent integration of data on international movements across New Zealand's borders into Statistics New Zealand's prototype Integrated Data Infrastructure (IDI), new avenues for migration related research have opened up. This report uses this new data to produce descriptive statistics on the rates at which graduates from tertiary education institutes (TEIs) leave New Zealand post-study, and the extent to which they return again. It looks at the cohort of New Zealand students who completed a tertiary qualification in 2003 and the migration outcomes of this cohort up to, and including 2010.

This new information improves our understanding of the extent that graduates from TEIs are attracted overseas and therefore do not contribute, at least initially, to New Zealand's stock of human capital. It also sheds light on which type of graduate is more likely to leave New Zealand permanently. Over time, as we observe longer-term migration patterns, this information will also help improve the accuracy of estimates of the returns to government on its investment in tertiary education.

The next section discusses what is known about emigration. Section 3 describes the data and how the variables have been constructed. Section 4 introduces statistics on our key measures. Section 5 presents results from regressions looking at the probability of leaving New Zealand, the probability of subsequently returning and the probability of still being away. The final section summarises the main findings, reviews the limitations of the research and looks at future directions.

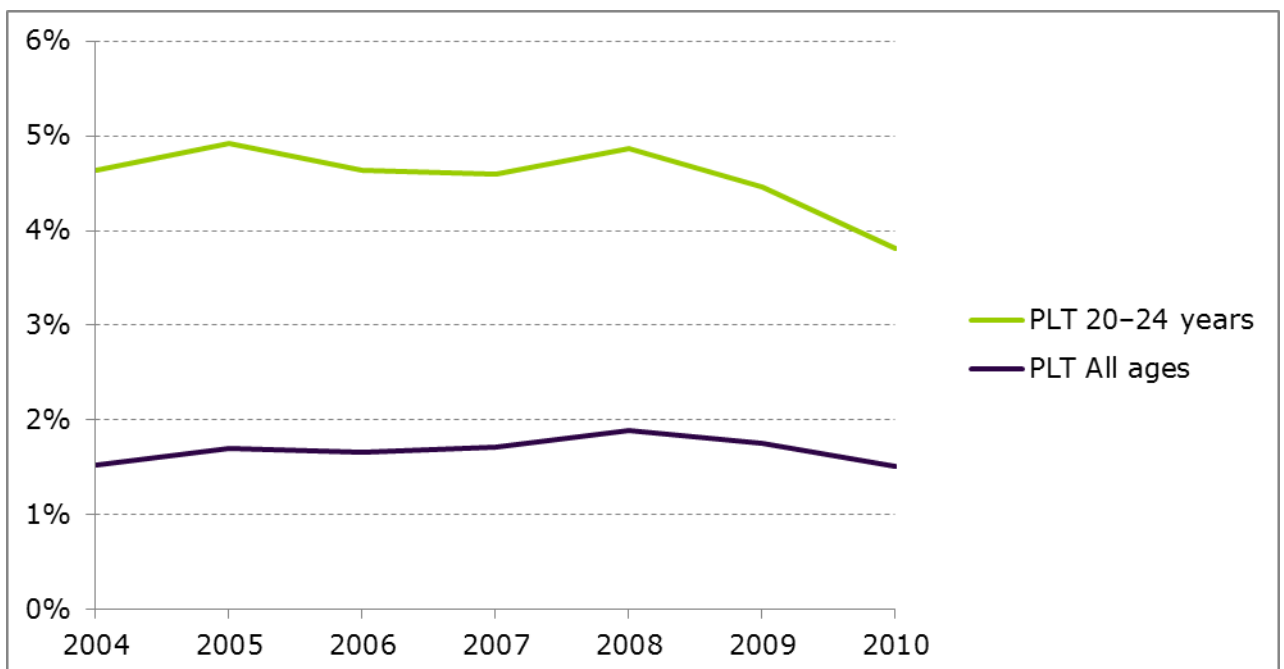
2 WHAT DO WE ALREADY KNOW?

2.1 Official statistics on PLT migration

The primary source of information on emigrants is Statistics NZ's data on permanent and long-term (PLT) migration. These statistics are based on electronic arrival and departure movements data for each international passenger, supplied by the New Zealand Customs Service. This information is augmented by arrival and departure cards¹ completed by passengers. These cards contain important additional information, such as final destination, occupation and intended length of arrival or departure. This last piece of information is used to define PLT migration. Permanent and long-term departures include New Zealand citizens departing for an intended period of 12 months or more (or permanently), plus overseas visitors departing from New Zealand after a stay of 12 months or more.

This section looks at what these statistics tell us about emigration over the same period our report will be covering, 2004 to 2010. Figure 1 shows annual PLT departures as a proportion of the estimated resident population. It shows that PLT departures make up between 1.5-2.0 percent of the population each year, and for 20–24 year olds the rate is usually between 4-5 percent. There was a noticeable dip in PLT departures (especially for the younger population) at the start of the global financial crisis.

Figure 1: Annual PLT departures (June year) as a proportion of the estimated resident population



Source: Statistics NZ, international travel and migration statistics and population estimates.

¹ We were restricted to using the electronic arrival and departure movements data only. We discuss the effects of not having access to arrival and departure cards in section 3.

The official statistics also tell us where PLT departures are heading to reside. They show that by 2010 around 53 percent of all PLT departures were heading to Australia, and a similar proportion of 20–24 year olds. This was an increase for both groups, rising from 43 percent in 2004 for the overall population, and from 38 percent for the 20–24 year old group. Note that these proportions include overseas visitors departing from New Zealand after a stay of 12 months or more. When these are excluded by looking at PLT departures that were New Zealand citizens or born in New Zealand, the proportion going to Australia was around two thirds in 2010.

The PLT statistics do not contain information on qualifications, but they do have information on occupations, for those migrants who specified an occupation. This tells us that migrants to Australia tend to be lower skilled than other emigrants. Around 40 percent of PLT departures to Australia are in higher skilled occupations, compared to 60 percent of PLT departures to other countries. The occupational mix of PLT departures did not change substantially between 2004 and 2009.²

One limitation of the PLT migration statistics is that they do not tell us the extent that PLT departures return to New Zealand. In addition, PLT statistics are based on someone's intention when leaving New Zealand and their subsequent behaviour could be different. For example, someone who was classified as a PLT departure, could subsequently return after a short period away (this situation is referred to as 'category jumping').

2.2 The database on immigrants in OECD countries

The OECD has constructed a database on the demographic and labour market characteristics of immigrants living in OECD countries from data primarily sourced from national population censuses. By looking across the information held by other OECD countries it is possible to get a picture of New Zealanders living abroad.

This database shows that in 2006 New Zealand was estimated to have the fifth-highest foreign-born proportion (21 percent) of the resident population in the OECD, and the second-highest proportion (14 percent) of locally-born people living abroad.

An earlier comparison³ using 2001 Census data found that New Zealand was equal-highest with Ireland in the OECD in the proportion of the highly skilled population (diploma or higher) who were expatriates (24 percent). It also found that a higher proportion of New Zealand expatriates (45 percent) and foreign born New Zealanders (31 percent) had diploma or higher qualifications, than the native born New Zealand-resident population (27 percent). Some of this is likely

² The occupation classification changed in 2009, making comparisons beyond this period difficult.

³ Dumont and Lemaître (2005).

due to New Zealand expatriates and foreign born New Zealanders having younger age profiles than the native born New Zealand-resident population.

2.3 Australian and New Zealand census data

Most of our emigrants are living in Australia. Some research has used Australian census data to look at the characteristics of New Zealanders who have migrated there. For example, Haig (2010) used 2006 Australian and New Zealand censuses to conclude that:⁴

- New Zealanders working in Australia held similar qualifications to those working in New Zealand
- New Zealand workers who moved to Australia between 2001 and 2006 were more highly qualified than their predecessors
- New Zealanders with bachelors or higher qualifications in health and information technology were more likely to work in Australia than similarly qualified New Zealanders in other subjects
- the mining industry had the highest relative share of New Zealanders in Australia, followed by construction; relative shares of New Zealanders were lower in education and training, public administration, and agriculture, forestry and fishing
- those with degree qualifications or higher were slightly less likely to return to New Zealand in the 2001–2006 period than those with lesser qualifications.

2.4 Longitudinal cohort studies

Milne et al (2001) used the longitudinal Dunedin Multidisciplinary Health and Development Study to look at the emigration patterns of young New Zealanders. It found that 26 percent of their sample of people born in Dunedin in 1972/73 moved overseas to live between the ages of 18 and 26. The United Kingdom and Australia were the most common destinations.

This study found that “compared to non-emigrants, emigrants had higher IQ scores, were better qualified, leaner and fitter, and had happier and less stress-prone personalities.”

Sixty-three percent of emigrants planned to return in less than five years, 18 percent in more than 5 years (or never), and 18 percent were uncertain about their return. Those that indicated they wouldn't return until after 5 years, or would never return, were more likely to have left for better work opportunities and they were also more likely to have gone to Australia. However, they found no other differences in terms of qualifications, intelligence and personality between these different groups.

⁴ These conclusions are affected by difficulties in comparing qualification across the two country's censuses.

The authors concluded that most young New Zealanders in their sample who left for overseas were embarking on their OE. “Brain drain emigrants make up a sizeable minority of emigrants, but appear to possess no more skills than those who plan or choose to return.”

2.5 Prior work using integrated administrative data

The Ministry of Education has used earlier integrated administrative datasets to examine the extent that tertiary students go overseas after study. Smart (2006) used the Integrated Dataset on Student Loan Scheme Borrowers (IDS) to examine the likelihood that that students with student loans from the 1997 leaving cohort were declared overseas five years after leaving tertiary study. The key finding was that, after controlling for other factors, a higher student loan leaving balance was associated with a higher likelihood of borrowers being declared overseas. Older borrowers, Māori and Pasifika borrowers, borrowers that studied at lower levels or in the fields of agriculture, environmental and related studies, and education, were all less likely to be declared overseas. Borrowers who studied at the doctoral level were the most likely to be declared overseas.

Smart (2011) used another integrated administrative dataset, the Employment Outcomes of Tertiary Education (EOTE) dataset,⁵ to examine the extent that 2003 doctoral graduates were employed in New Zealand post study.⁶ This report also estimated the proportion of these graduates that were overseas post study. The EOTE dataset did not actually identify if graduates were overseas. Instead, 2006 Census employment rates for doctorates were used to estimate the share of non-employed graduates who were overseas.

The report estimated that around 26 percent of 2003 doctoral graduates were abroad two years after leaving study. Younger graduates were estimated to be more likely to be overseas, while Māori graduates were estimated to be less likely. The report also found that post-study employment rates in New Zealand were lower for Asian graduates and graduates in natural and physical sciences. Smart thought it likely that these graduates were more likely to be overseas, as Asian graduates were more likely to be permanent residents and science graduates may have faced limited employment opportunities in New Zealand.

Smyth and Spackman (2012) used similar integrated administrative data to that used in our report. Their dataset was created from linking electronic international movements data for the period from 2007 to 2010, to Inland Revenue data on student loans. Their paper looked at two questions pertinent to our project. The

⁵ This dataset is described in section 3.

⁶ Smart looked at roughly the same cohort of 2003 doctoral graduates that we analyse in this paper. One difference was our exclusion of those domestic doctoral graduates who spent an extended period overseas using a non-New Zealand passport before study. The difference between our count of 354 doctoral graduates (see table A2) and the 495 count in Smart’s report is partly due to this exclusion. The rest is likely explained by our exclusion of those graduates who last enrolled in 2003 but for whom no completion record was recorded until after 2004.

first was: who used student loans and then went overseas? They found that about 19 percent of students who left study in 1999 or later, and had student loans, were overseas in 2010. Those who went overseas were more likely to have been aged between 25 and 34 in 2010, studied at higher levels and been successful in their studies.

The second question was: who returned and who stayed overseas? The report found that the characteristics of those who stayed overseas and those who returned could not be distinguished (given the available variables and time periods covered). Of those who left study in 1999 or later and who were overseas on or after April 2007, 26 percent had returned to New Zealand by March 2010. Almost 70 percent of those who had returned had been away for three years or less.

The prototype IDI database that we used in our research improves on the data that these reports had available. Unlike Smart's research, we can now observe actual graduate migration patterns. And unlike Smyth and Spackman, the IDI allows us to look at emigration outcomes for all participants in tertiary education not just those who have borrowed from the student loan scheme. The IDI also allows us to look at international movements for a wider time period.

2.6 Summary

We know some things about people that leave New Zealand. New Zealand has lost a higher share of its population to emigration than most other OECD countries. Younger people are more likely to leave New Zealand. They tend to have a higher skill profile and be more qualified than New Zealanders as a whole, even after controlling for age. We know less about the extent that New Zealand emigrants return to New Zealand. There is some evidence that those that go to Australia and those who leave for better work opportunities are less likely to return.

It may help to generalise and simplify our New Zealand emigrants into one of two groups. The first comprises those two thirds of migrants who move to Australia. Australia is a logical choice for New Zealanders who wish to migrate. The costs of moving are low and New Zealand shares a common labour market with Australia, which means no skills or other requirements need to be met. New Zealanders may also earn higher returns on their skills in the Australian labour market. Australia-bound emigrants seem to have a similar qualification profile to New Zealanders back home. However, there is some evidence that higher skilled migrants to Australia are less likely to return to New Zealand than those with lesser qualifications.

The second group are young people leaving for OE or working holidays, predominantly to the United Kingdom. They tend to be better qualified than New Zealanders as a whole, even after controlling for age. Most plan to return to New Zealand within 5 years. They generally need to meet local immigration requirements if they wish to stay away on a permanent or long-term basis.

Therefore this group is more likely to return in the long term than those going to Australia.

Note that for some New Zealand emigrants, Australia is a stepping stone before they move further afield. And for some New Zealand emigrants who decide to return from the United Kingdom, this means returning to Australia rather than to New Zealand.

3 DATA

3.1 Data source

In 2009 Statistics NZ, the Ministry of Education and the Department of Labour, created a new dataset comprising linked data from education agencies with employment related tax data from Statistics NZ's Linked Employer-Employee Database (LEED). The creation of this dataset, and the release of preliminary research from it, showed that the production of information on the employment outcomes of tertiary education (EOTE) was feasible. The Ministry of Education is currently working on producing this information on an on-going basis.

In 2011, Statistics New Zealand began consolidating its linked datasets into the IDI prototype, which also linked in immigration and international movements data supplied by the Department of Labour (Statistics New Zealand, 2012). This report makes use of the new unit record link between tertiary education and international movements data that exists in the IDI prototype. These datasets are linked through the Inland Revenue data which is at the core of the IDI prototype. Records are linked using name, date of birth and sex. Probabilistic linking is used to determine the likelihood that two records from different files belong to the same person.

The linking of international movements to Inland Revenue data in the IDI seems to be of high quality. The international movements data is based on passport information so has high quality demographic information. Initial estimates by Statistics NZ of the proportion of New Zealand citizens in the international movements data who should have been linked to the IDI but weren't (ie the false negative rate) is around 2-5 percent. Statistics NZ estimates that only around 0.3 percent of New Zealand citizens in the international movements data are matched to the wrong person (ie the false positive rate).

The tertiary education data also has high quality linking information. During the time period covered by this report, students were assigned a National Student Number (NSN) which meant that high quality demographic variables were available for probabilistic linking. In addition, around 14 percent of students in the tertiary education data had an IRD number, which allowed for direct matches. For the student population used in this report (see below) the false negative match to IDI appears to be around 4 percent. Statistics NZ estimates the false positive rate to be between 0.8 and 1.5 percent.

The only concern around the quality of the data integration is around the impact of students with multiple NSNs. This issue has been identified by the Ministry of Education and they are working with Statistics NZ to resolve this issue. Any errors arising from this are likely to be randomly distributed, which may add noise to the results from this paper, but should not bias them.

The integrated dataset contains information on qualifications (level of qualification and field of study), as well as some information on the student (age, sex, ethnicity, student loan balance). It does not contain information on country of

birth, or the number of years the student spent out of New Zealand before 1998, but we can observe whether the student travelled on a non-New Zealand passport between 1998 and 2011. We cannot observe final destination for students that leave New Zealand, but we can observe where the plane disembarked. There are a number of variables that are likely to help explain people's migration decisions, which are missing from the dataset. We discuss these matters more in sections 4 and 5.

3.2 Population

The population of interest are New Zealand domestic graduates from tertiary education institutions (TEIs). This excludes international students. It also excludes those in industry training or modern apprenticeships.⁷

The report will look at those New Zealand graduates who completed a qualification in 2003. This is the earliest student population that can be examined in the IDI, as this was the year when the NSN was introduced (the quality of data matching to the IDI is poor before then). Graduates were defined as those who were enrolled in a qualification in 2003, were not enrolled in a qualification in 2004, and their qualification was recorded as completed in either 2003 or 2004.

The left hand columns of table A1 show how the population is derived. The first row shows the total number of domestic (ie non-international) students that left tertiary study in 2003 was 156,615. Of these 94.6 percent were matched in the IDI.⁸

This report uses as its main population what is referred to in the table as 'NZ completers'. This excludes students who left tertiary study in 2003 without completing any qualification. It also excludes a small group of graduates who although domestic students, were observed in the IDI prior to 2003 spending a year or more out of New Zealand using a non-New Zealand passport.⁹ This was done to better define the target population of New Zealand domestic tertiary graduates, and remove a group of graduates that may have a strong pre-existing relationship to another country.

Two other populations are used in this report for comparison purposes.¹⁰ The first allows comparisons with younger graduates. The 'NZ young completers' population is based on the concept of a 'traditional' age of completion for each level of study. This is defined as the most common age of students at each level, with an additional three years added to account for breaks in study.

⁷ Both these groups can be examined in the IDI and may be the focus of future analysis.

⁸ In general, match rates are higher for younger students, higher for those who completed a qualification and increase with qualification level.

⁹ They were out of New Zealand for over 75 percent over any of the 1999–2003 tax years and had travelled in or out of New Zealand on a non-New Zealand passport.

¹⁰ Both these populations exclude those who were observed spending a year or more out of New Zealand using a non-New Zealand passport over the 1999–2003 tax years.

The second, called the 'NZ IDI' population, aims to allow comparisons with the migration patterns of the general New Zealand population. We restrict this population to 17 to 59 year olds to better match the distribution of the student population. Ideally, we would want to construct a non-graduate comparison group, but this is not possible because we cannot measure qualifications gained before 2003.

The nearest to an overall New Zealand population that can be achieved in the IDI currently is looking at the number of people who received some form of taxable income (including both taxable earnings and benefits) over the 2004 tax year. As such it will include many of our graduates. It will not capture everyone in the New Zealand population. Figures from the Household Economic Survey for the year ended March 2004 suggest that around 9 percent of people aged 17 to 59 did not receive the types of income measured in the IDI, with around two in three being female.

Our 'NZ completers' population is only around 2 percent of the overall 'NZ IDI' population, but this is just the flow of graduates into the population aged 17 to 59 for one year. The fact that around two thirds of 25 to 29 year olds have completed a tertiary qualification, as measured in the Household Labour Force Survey, suggests that a similar proportion of young people will be tertiary graduates at some stage.

The graduate populations used in this paper are almost identical to those used in the 2009 EOTE studies - Scott (2009) and Statistics NZ (2009). One difference is that those papers did not exclude those that were outside New Zealand for an extended period prior to completion. The other difference is that those papers excluded from their populations students who had returned to study in the three years post completion.¹¹ This paper only excludes those that that did not study in 2004, the year after completion.¹²

3.3 Defining extended periods out of New Zealand

To measure the extent that graduates leave New Zealand, and the extent they return, we need some measure similar to PLT departures. Official statistics on PLT departures are based on travellers' intentions, as recorded on departure cards (those departing for an intended period of 12 months or more).

The IDI does not contain data from arrival and departure cards.¹³ Instead, this report uses passport and flight data on international movements into and out of New Zealand. Through data integration into IDI, all international movements into

¹¹ That made sense for those reports, with their focus on earnings outcomes.

¹² Another minor difference with the Scott paper is how young completers (leavers) are defined. In this paper it is modal age of study for each level of qualification plus three years, in that paper it was plus two years. This change was made in line with current Ministry of Education practice.

¹³ There have been discussions on integrating this information into the IDI.

and out of New Zealand by each traveller are linked together. This means it is possible to accurately see when someone leaves New Zealand and whether they return.

In some ways this is better than having arrival and departure cards. People's intentions can change after they leave, and what was intended to be a PLT departure doesn't turn out to be or vice versa (ie 'category jumping').¹⁴ The international movements data records actual behaviour so is not affected by this.¹⁵ Instead of measuring if someone is a PLT migrant, we can identify if someone is out of New Zealand for some extended period.

So how best to define this extended period? Two situations need to be accounted for in any definition. People leave New Zealand for short spells and are still resident in New Zealand. Alternatively, many non-residents (including New Zealanders that have previously emigrated) visit New Zealand for short periods but do not become New Zealand residents. To account for this, we look at the extent that graduates are in New Zealand or not over annual spells, from 2004 to 2010¹⁶, by summing the days spent out of New Zealand each year. 2010 is the latest year of international movements data currently available in the IDI. We then apply a 75 percent (or 275/365 day) threshold for someone moving from 'in NZ' to 'out of NZ'.

The rule is implemented as follows:

- those in New Zealand in one year, who spend 75 percent or more of the subsequent year out of New Zealand, are defined as being abroad in the subsequent year
- those out of New Zealand in one year, who spend 75 percent or more of the subsequent year back in New Zealand, are defined as being in New Zealand in the subsequent year.

The Australian Bureau of Statistics (ABS, 2010) applies a similar 75 percent threshold when calculating the impact of net overseas migration on their population estimates. To overcome 'category jumping', the ABS excludes an Australian from the resident population if they away from Australia for 12 months or more over a 16 month period.

Figure 2 shows how variations in this threshold (50, 75 and 90 percent) affect the proportion of 'NZ completers' (the population of interest) who were 'out of NZ' in the seven years after they left study. With the approach used in the rest of this report, 18.8 percent of graduates were 'out of NZ' in 2010. The key difference

¹⁴ If arrival and departure cards are integrated into the IDI, it would become a powerful tool in understanding the discrepancy between migration intentions and outcomes.

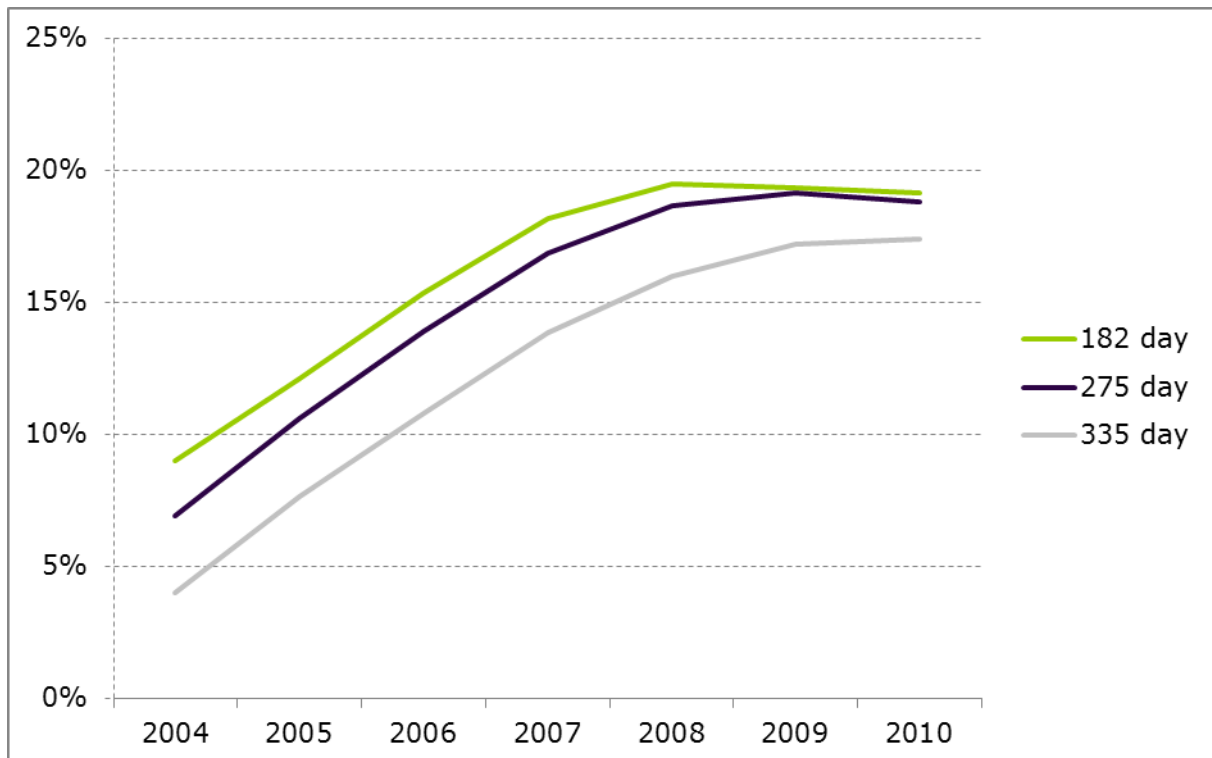
¹⁵ One advantage of the arrival and departure cards over the international movements data is timeliness. You do not have to wait until you see the subsequent migration behaviour to be able to define someone as a PLT or not.

¹⁶ Actually 2005 to 2011 tax years, and the 2011 tax year is the latest year available in the IDI.

between the different measures is that the higher the threshold, the more likely to (because spells are split across years):

- exclude shorter spells
- exclude the start and end of longer spells.

Figure 2: Proportion of 'NZ completers' 'out of NZ' using alternative thresholds



Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Comparing the 182 and 335 day population, around 21 percent of 'NZ completers' had different 'out of NZ' spells using the two methods. Of those graduates with differences:

- around a third went from having no time 'out of NZ' using the (335 day rule) to having some time
- the other two thirds saw their spells lengthened, most of them at the start or end of the spell

All three series start to converge from around 2008 onwards. This seems to be because the shorter spells, which are most affected by choice of definition, become a smaller share of total spells over time.

4 DESCRIPTIVE RESULTS

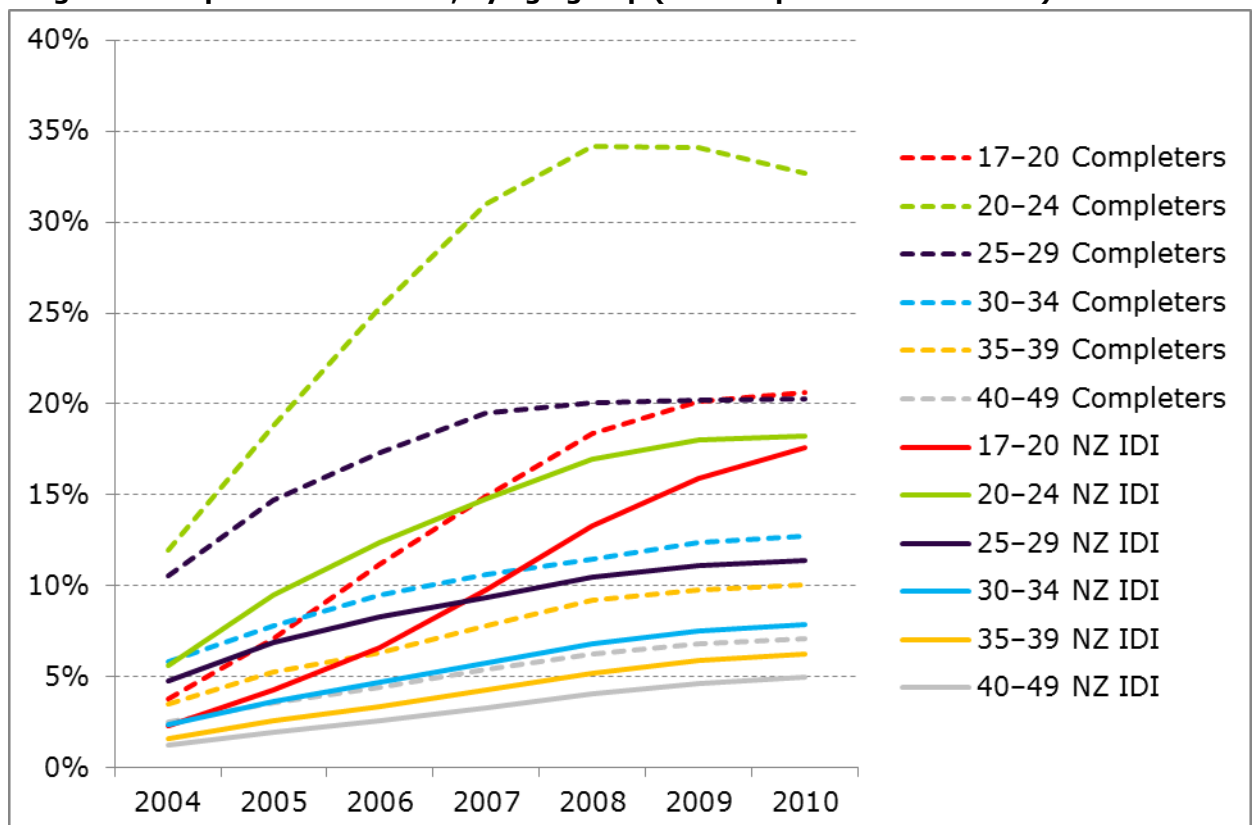
4.1 How do the different student populations compare?

Table A1 compares different student populations using the 'out of NZ' measure with the 75 percent threshold that we discussed in the last section. The graduate population that we will be concentrating on for the rest of the paper ('NZ completers') does not generally spend extensive periods overseas. This group spends 1.0 years abroad on average (out of a possible 7 years) and 74.1 percent of graduates did not spend any year 'out of NZ'. Changing the student population has the following effects:

- removing those graduates who had spent a significant amount of time 'out of NZ' on an overseas passport prior to completing their qualification reduces the number of years 'out of NZ' (eg 'all students' vs. 'NZ only')
- removing students who did not complete their qualification increases amount of years spent overseas (eg 'all students' versus 'completers only')
- removing older students using the 'young completer' definition ('all students' versus 'young only'), strongly increases the amount of years spent overseas.

Comparisons with the 'NZ IDI' population (our version of overall New Zealand population) in table A1 are near meaningless. The age distributions of the IDI and student populations are very different, and age has a strong relationship to whether someone leaves New Zealand, as seen in figure 3.

Figure 3: Proportion 'out of NZ', by age group ('NZ completers' vs. 'NZ IDI')



Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

A result that stands out from the diagram is the extent that young people in general leave New Zealand. For those aged 17 to 24 years old in 2003, around 18 percent were abroad in 2010. The proportion abroad of those aged 20 to 24 who completed a qualification was far higher, although decreasing by 2010.

Figure 4: Proportion 'out of NZ', by age group and sex ('NZ completers')

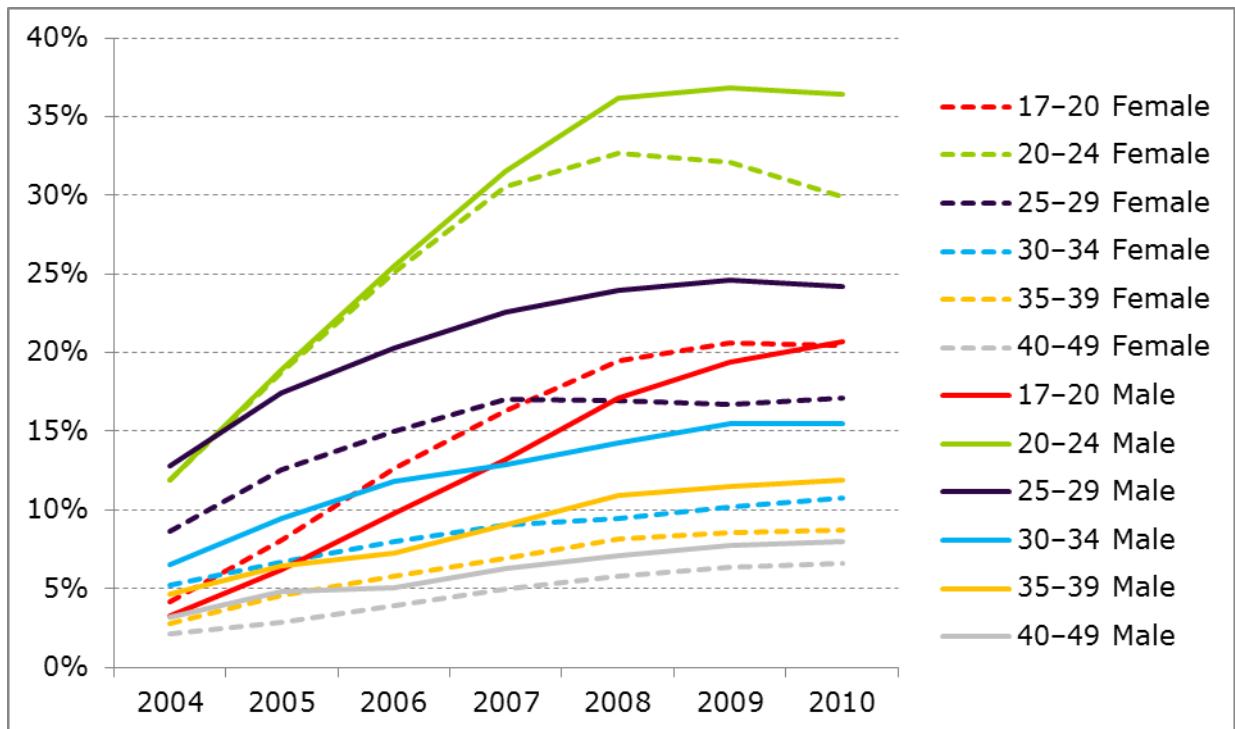
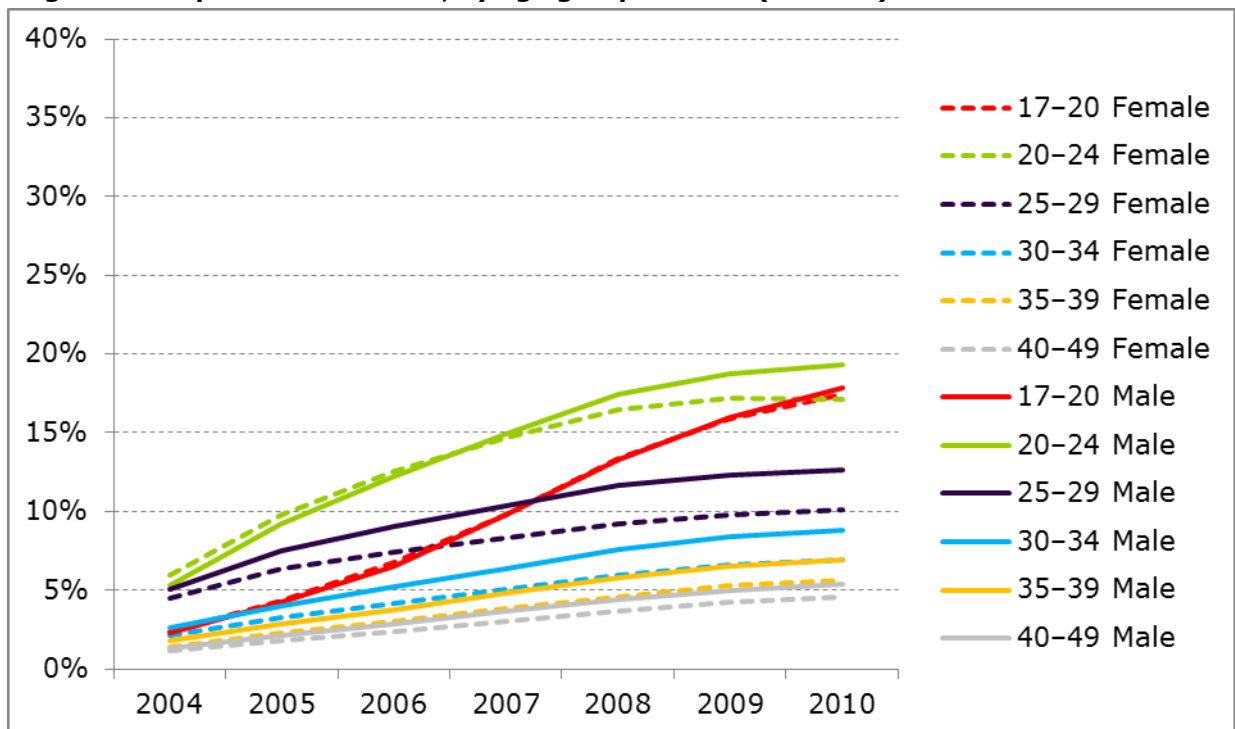


Figure 5: Proportion 'out of NZ', by age group and sex ('NZ IDI')



Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Figure 4 looks at differences by sex and age for our graduate population. By 2010, for every age group, male graduates were more likely to be 'out of NZ' than female graduates. This difference seems to grow over time for most age groups. Note that for the 17–20 age group, females were more likely to be abroad in earlier years, before being caught up by their male counterparts.

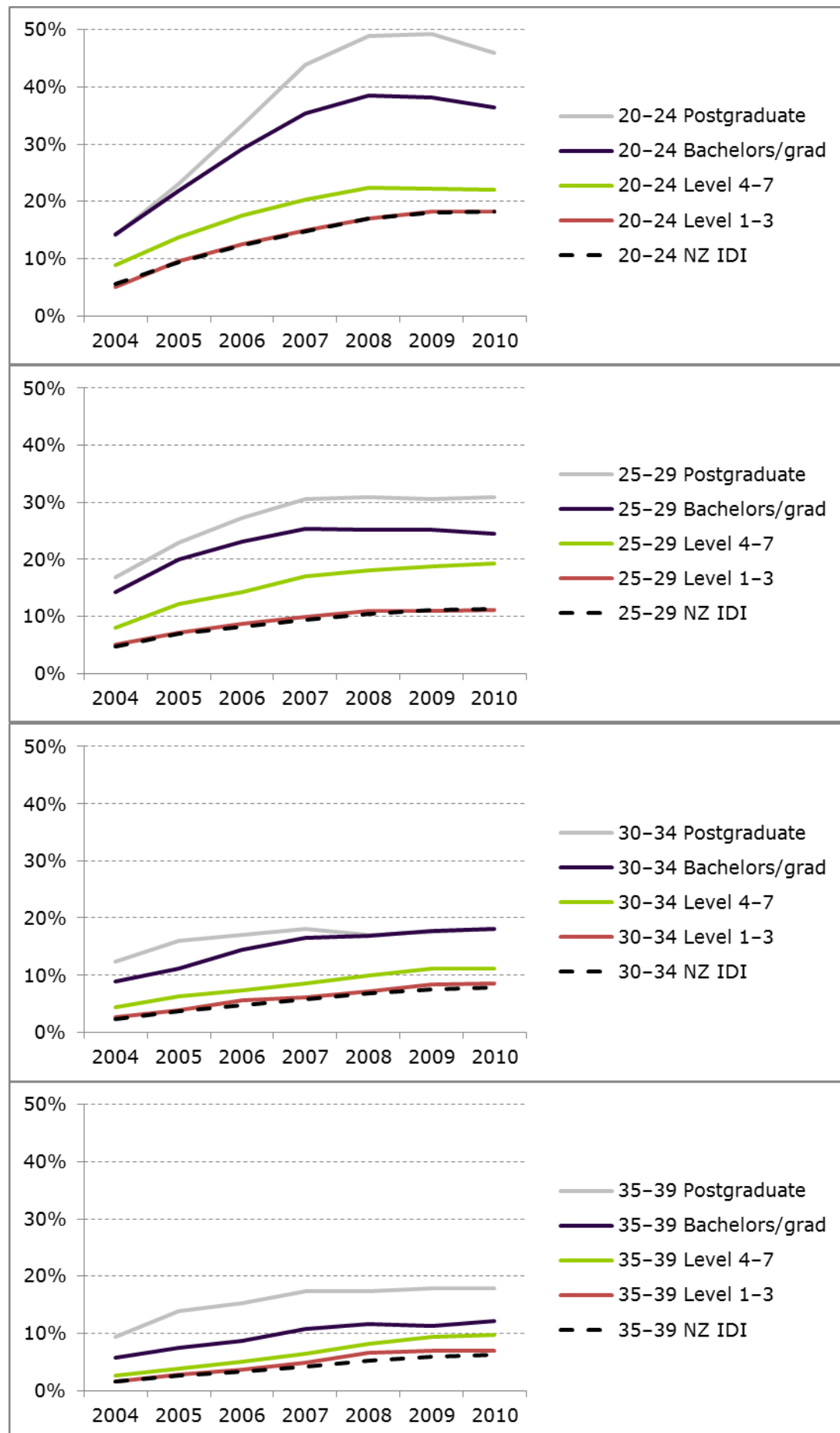
Figure 5 is the equivalent for the general population comparison group. Again for every age group, males are more likely to be overseas than females, though the relative differences tend to be smaller than for graduates.

The diagrams on the next page show how the proportion 'out of NZ' varies by the level of qualification that the graduate completed in 2003.¹⁷ They show for every age group, the proportion abroad generally increases with the level of the qualification completed. The differences between levels decrease with age group. For those aged 20 to 24 years who completed higher qualifications, the proportions abroad seem to peak in 2008 to 2009.

The diagrams also contain the proportion of the 'IDI' comparison population for that age group. These proportions are relatively low and very similar to the proportions abroad for those who completed a level 1–3 certificate.

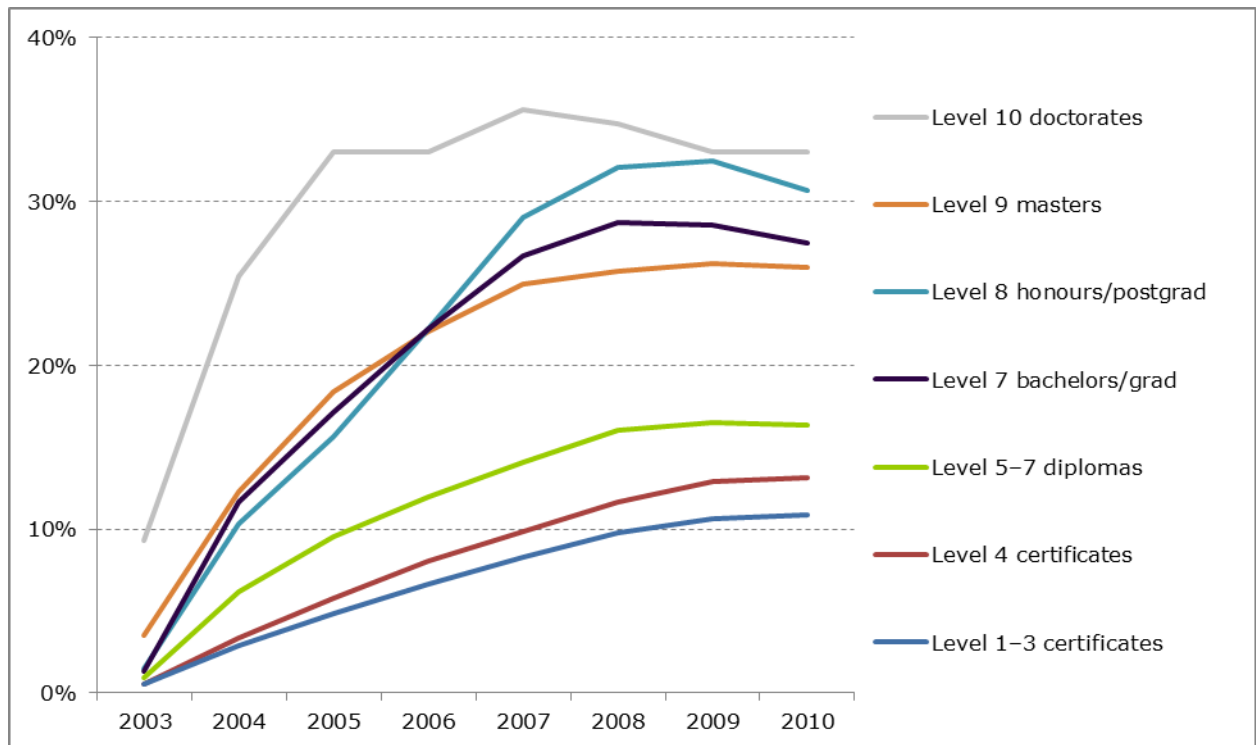
¹⁷ In this report we sometimes use this aggregated level of qualification classification for cross tabulations. We aggregate level 4 certificates and level 5-7 diplomas together in one group. And level 8 to 10 postgraduate qualifications in another. This is the same aggregation used in Statistics NZ (2009).

Figure 6: Proportion 'out of NZ' for 'NZ completers', by age group and level



The final diagram in this section shows the proportion of graduates abroad by a more detailed breakdown of qualification level. Again, the proportion abroad in 2010 increases with level, with the exception of those with masters degrees. This last result changes once we control for the characteristics of the graduates, as we do later in this report.

Figure 7: Proportion 'out of NZ' for 'NZ completers', by detailed level



Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

As mentioned in section 2, Smart (2011) estimated that around 26 percent of 2003 doctoral graduates were abroad two years after leaving study. Our estimate is higher, at around 33 percent. Smart's proportion is estimated from the proportion of graduates who did not receive any earnings in New Zealand throughout 2006. With our methodology it is possible to have received earnings in New Zealand during 2006 (ie before leaving New Zealand, or after returning) and still be 'out of NZ'. This will explain some of the difference.¹⁸

Figure 7 also shows the proportion abroad in 2003, the final year of study. This shows that for most levels, a very small proportion were abroad in this year as you would expect.¹⁹ The exceptions are those who completed a doctorate in 2003.

¹⁸ Another possible explanation is in Smart having to use 2006 Census *weekly* employment rates, to rate up *annual* employment rates. This may have underestimated the proportion of graduates overseas.

¹⁹ Being 'out of NZ' in 2003, means being abroad for more than 75 percent of the days between 1 April 2003 to 31 March 2004, so it is possible for some graduates to be abroad in the same year as completion. Others are likely to be part of the estimated 0.3 percent of people in the international movements database who are matched to the wrong person in IDI.

Around 9 percent of this group were abroad in 2010. Perhaps these graduates had actually completed their qualification before the completion date that is in the administrative data. Another possible explanation is that these graduates had already begun their postdoctoral study abroad before completing their doctorate.

This indicator, the proportion 'out of NZ' each year, summarises the results of two decisions that graduate makes. First, whether they should leave New Zealand for an extended period. Second, for those who do decide to leave, whether they should return to New Zealand. The rest of this report will look at the decisions our population of 2003 graduates had made by 2010.

4.2 How does our method compare with that used for official statistics?

We start by comparing our method for determining whether someone has left New Zealand for an extended period, with that used for official statistics. Figure 8 takes the annual departure rates from the official PLT statistics, as previously shown in figure 1, and adds departure rates for our IDI version of the New Zealand resident population.

Figure 8: Annual departure rates, official PLT statistics vs. 'IDI' population



Source: Statistics NZ, international travel and migration statistics and figures have been extracted from the IDI prototype managed by Statistics NZ

The comparison between the two groups becomes less robust over time. This is because the IDI comparison group is based on a fixed cohort, those who were aged between 17 and 59 years and received taxable income in 2003. Even though we calculate the IDI departure rates based on age when leaving, the IDI groups tend to age over time as the initial cohort ages, and no new younger people are

added. For example, the IDI 20–59 group goes from including 20 to 59 year olds in 2006, to being 24–59 year olds in 2010.

This means that the comparison between the PLT and IDI departure rates are most valid for 2004. From this we can see that our departure rates are around 80 percent of the PLT departure rates, slightly less for 20–24 year olds. A likely explanation for this difference is that around 30 percent of PLT departures consist of overseas visitors departing from New Zealand after a stay of 12 months or more. We will have excluded many of these by using domestic graduates as our population, and excluding those who were out of New Zealand before 2003 for a year or more using a non-New Zealand passport.

4.3 Who is more likely to leave after completing study?

Using our measure of 'out of NZ' we look at the proportion of 2003 tertiary graduates that left New Zealand in the seven years after they completed their qualification. The second column of table A2 shows that just over one in four (25.9 percent) graduates spent at least one of these years abroad.

The likelihood of leaving increases strongly with the level of the qualification, from 14.2 percent for those with level 1–3 certificates to over 40 percent for those with level 8 honours/postgrad or doctorate level qualifications. Again the exception here is the leaving rate for those with masters degrees, who leave at a lower rate than those with bachelors degrees – although this discrepancy goes away when we control for differences in the profile of graduates (eg the differing age profiles).

We also present results for the proportion of 2003 tertiary graduates that left and were abroad for more than two years between 2004 and 2010. Overall, 72 percent of graduates that left were away for more than two years during this period. The likelihood that someone who left, left for more than two years, generally increases with level. However, this effect is at least partially explained by the fact that lower level qualifications are more likely to leave near the end of the seven year period, and therefore not pass the two year threshold. We'll control for this when we look at return rates in the next section.

Table A2 also shows that females are less likely to leave than males across all levels, and young people are much more likely to leave than older cohorts across all levels. Table A3 present results for the 'NZ young completers' population, which only includes tertiary graduates in traditional age bands for each level. Comparing tables A2 and A3 is another way of seeing the effect of age on the probability of leaving.

There are a number of subject areas at the bachelors and postgraduate level where the leaving rate is near or above 50 percent. This is especially true for the young completers population in table A3. We will look more closely at field of study later in this report.

The third column in A2 gives the proportion of leavers that left for Australia; or more correctly, the proportion whose plane disembarked in an Australian airport. The IDI data does not yet contain information on the final destination for people who depart from New Zealand. However, the international movements data does tell you where the plane landed. This is limiting, as for many PLT departures, the final place of residence will be different to where their initial plane lands. However, it is likely that Australia is the final destination for most PLT departures whose plane lands in Australia. Therefore we simplify this information into an 'Australia' or 'rest of the world' variable.

Comparisons with official PLT statistics seem to suggest that our 'Australia' or 'rest of the world' variable performs relatively well. For example, around 70 percent of the overall population aged 17–59 – using our IDI population - who left New Zealand between 2004 and 2010, left for Australia. In comparison, when looking at PLT departures (across all ages) that were New Zealand citizens or born in New Zealand, the proportion going to Australia was around 65 percent over the same period.

Table A2 shows that around 60 percent of graduate departures left for Australia. The likelihood of leaving for Australia generally decreases with level (from 79 percent for level 1-3 certificates to 42 percent for doctorates). This is in line with our earlier expectations that departures to Australia would have a lower skill profile than other departures.

Table 2 compares the leaving behaviour of our graduate population, with our 'NZ IDI' population, which is our representation of the overall New Zealand population. As expected, the overall population is less likely leave across all age groups, but those who do leave are more likely to leave for Australia.

Table 2: Leaving rates over 2004–2010, graduates vs. overall population

Age band	'NZ completers'		'NZ IDI'	
	% that left 2004-10	% of leavers that left for Australia	% that left 2004-10	% of leavers that left for Australia
17–20	28.2	78.1	22.8	73.5
20–24	46.5	52.7	25.7	63.3
25–29	27.6	56.9	15.6	66.8
30–34	16.0	67.6	9.7	73.3
35–39	12.1	73.3	7.5	75.4
40–49	8.7	68.7	6.0	75.8
50–59	6.6	63.2	4.3	70.6

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3.

4.4 Who is more likely to return from abroad?

We need to be careful how we measure the likelihood of return from abroad. We cannot simply look at the overall proportion of leavers who return because our

data is censored - we can only see migration patterns up to 2010. This means those that leave earlier are more likely to be observed returning.

This can be seen in the following table which shows the year that graduates first return to New Zealand, by the year that they first left New Zealand. For those graduates that left in 2004 we can see whether they returned up to 6 years after being abroad. For those that left in 2009, we can only see if they returned the following year.

Table 3: Year first left New Zealand, by year first came back ('NZ completers')

Returned after	Year first 'out of NZ'					
	% 2004	% 2005	% 2006	% 2007	% 2008	% 2009
1 year abroad	6.7	6.1	6.0	7.4	9.0	6.3
2 years abroad	10.6	10.3	13.6	15.1	15.0	...
3 years abroad	6.8	8.4	8.6	9.3	...	...
4 years abroad	4.9	6.8	7.9	...	...	...
5 years abroad	4.5	5.9	...	...	...	...
6 years abroad	3.0	...	...	...	...	...
Still abroad	63.5	62.6	63.8	68.2	76.0	93.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3. '...' indicates that this information cannot yet be observed.

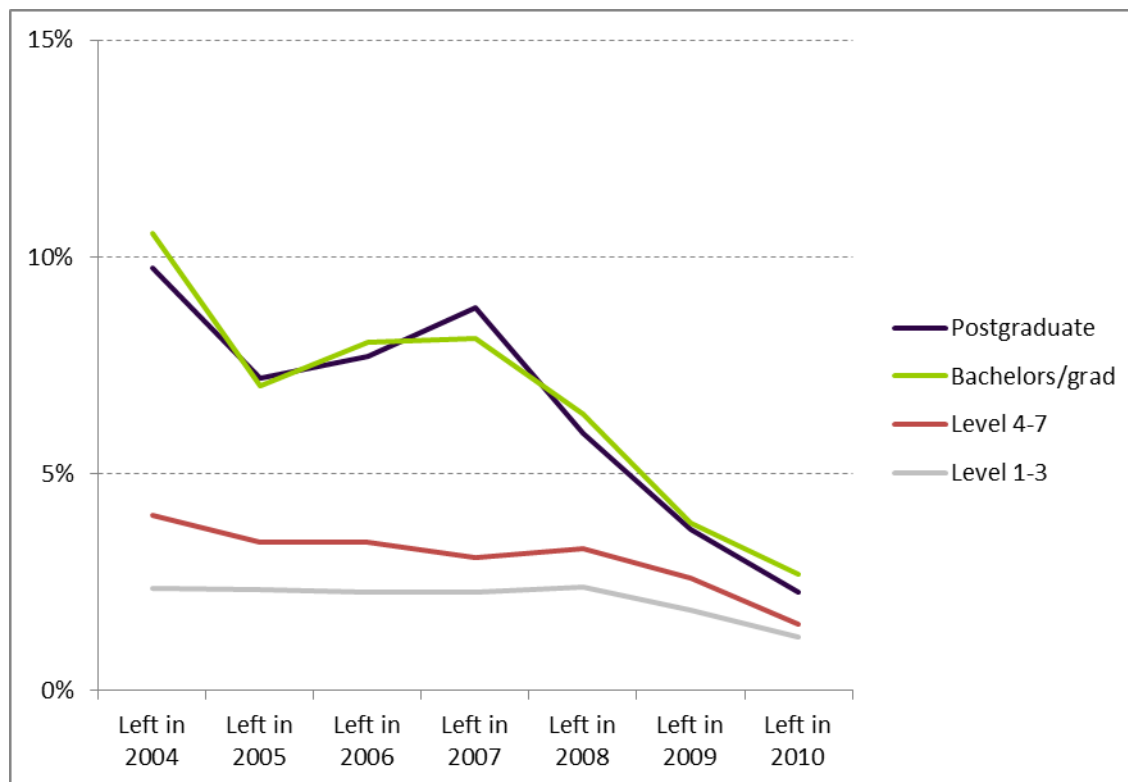
This especially matters because different groups leave at different times. Figure 9 shows the proportion of graduates that leave each year.²⁰ There are two peaks for bachelor and postgraduate degrees, the year after graduation and then three years after. It seems that graduates in bachelor and postgraduate qualifications tended to go overseas straight after graduation or after a few years in the workforce. In comparison, graduates in lower level qualifications tended to leave at a more consistent rate over the seven year period. In doing so they are behaving more like the overall New Zealand population.

By 2010, the leaving rates across all levels are similar. Like the PLT departure statistics for the overall New Zealand population in figure 1, there is evidence of

²⁰ This only includes the first leaving year for those graduates that return and subsequently leave again. Also, for each leaving year, those that had previously left are removed from the denominator to give a better indication of the probability of leaving.

leaving rates falling in 2009 and 2010, around the time of the global financial crisis. However, in figure 9 the fall in leaving rates is magnified by the aging of our cohort of graduates over the seven years. As we have seen, the likelihood of leaving decreases with age.

Figure 9: Leaving rates over time for the 'NZ completers' population



Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

To make robust comparisons we need to compare groups for which we can observe the same time span for them to return. To do this we have constructed two return rate indicators:

- those that left New Zealand between 2004 and 2008, but were back 'in NZ' two years after the year of departure (referred as the 'yr2' return rate)
- those that left New Zealand in 2004 or 2005, but were back 'in NZ' four years after the year of departure, and were also in New Zealand in the fifth year (referred to as the 'yrs4+5' return rate)

The reason why the yrs4+5 return rate looks at graduates who were back 'in NZ' in both years four and five is to get a better indication of those that are back permanently. There is a fair amount of churn among returning graduates, especially younger ones. For example, 5.0 percent of graduates who left New Zealand in 2004 or 2005 had returned sometime in the subsequent four years, but had left again by the fifth year.

These two return rates let us look both at the wide range of leaving years (the 'yr2' rate which measures horizontally across table 3) and also return rates after longer periods away (the 'yrs4+5' rate which measures vertically down table 3).

Table A2 presents return rates for our graduate population. It shows that 19 percent of graduates were back 'in NZ' two years after the year they left. For those that left in 2004 or 2005, only 25.6 percent were back in both years four and five.

The relationship between qualification level and these return rates is not as straight forward as it was with the leaving rate. Return rates are lower for postgraduate qualifications compared to those of a lower level. Females generally have higher return rates, but there does not seem to be a clear pattern in return rates by age. We'll discuss return rates by field of study in the next section.

Table 4 shows that for every qualification level, except for masters and doctorates levels, return rates were lower from Australia. This is what we would expect. Those that travel to other destinations generally need to meet local immigration requirements if they wish to stay away on a permanent or long-term basis. This is not the case for Australia.

Table 4: Graduate return rates by level, Australia vs. rest of the world

Level	% return (yrs4+5) from Australia	% return (yrs4+5) from rest of the world
Level 1–3 certificates	21.0	34.0
Level 4 certificates	21.4	33.3
Level 5–7 diplomas	28.7	42.6
Level 7 bachelors/grad	23.5	28.8
Level 8 honours/postgrad	21.3	27.1
Level 9 masters	22.5	18.9
Level 10 doctorates	22.2	20.0
All levels	22.8	29.7

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3.

4.5 Who is more likely to be still away?

Given these rates of return, which type of graduates were more likely to be away at the end of 2010 – the latest year we can observe? Around 19 percent of graduates were abroad in 2010. This number is inflated by graduates who had just left New Zealand.

Of more interest is knowing which of our graduates had left New Zealand permanently. The closest we can get to this, is looking at graduates who were abroad in each of the three years from 2008 to 2010. Table A2 shows that 15.1 percent of graduates were out of New Zealand over this period. The proportion abroad using this indicator increases strongly with level (except again for masters degrees), from 8.2 percent for level 1–3 certificates to 30.5 percent for doctorates.

Around 60 percent of graduates that left for a year or more between 2004 and 2010 were still away in 2010, and had been for at least three years. The likelihood that someone who left was still away between 2008 and 2010 was higher for those with postgraduate qualifications. This reflects the lower return rates for these qualifications, and the fact that those with lower level qualifications were more likely to leave near the end of the seven year period and therefore less likely to be abroad through 2008–10.

5 REGRESSION ANALYSIS

We have briefly looked at the way the likelihood of leaving New Zealand, the likelihood of returning, and the likelihood of still being away, vary according to the age and sex of the graduate, or the type of qualification they had completed. In this section we now control for the way these different characteristics interact using regression modelling. In particular we use logistic regression (as our variables of interest are binomial) and report average marginal effects calculated from the regression coefficients for ease of interpretation.²¹

Regressions are run on our three key measures:

- Leaving - the proportion of all 2003 graduates who left New Zealand for a year or more between 2004 and 2010
- Returning – the proportion of 2003 graduates who left New Zealand in either 2004 or 2005 and were back in New Zealand in years four and five after leaving
- Still away – the proportion of all 2003 graduates that were still abroad through 2008 and 2010 (ie in all three years).

There are two key limitations to our analysis. We have already talked about the first, censoring of observations beyond 2010. This has a bigger impact on our estimates of return. If we could see further in the future, we may see a different picture of how qualifications and other characteristics influence the likelihood of return. We therefore see our indicators on those who have left, or were away at a particular time, as being more robust than our indicators of return.

Our regressions are also missing many variables that are likely to help explain people's migration decisions. These include factors such as comparisons of economic opportunities in New Zealand and abroad, the level of international risk (already seen in the impact of the global financial crisis), the influence of peers, the pull and push of personal relationships in New Zealand and abroad, and the extent that some graduates can live in countries for extended periods due to where they, or their parents, were born. These last two factors are likely to be picked up in ethnicity results, as we will see later.

5.1 Level of qualification

The results from our regressions are contained in the appendix. Tables A4-A6 show the results for each of our three key measures by level. Each table shows the marginal effects of switching from a level 1–3 certificate to each of the other qualification levels, on the indicator of interest. Table 5 below summarises the results from the regressions that controlled for the full set of observable covariates.²²

²¹ Significance is shown using robust standard errors.

²² In particular, table 5 (and table 7 later) report the average adjusted predicted probabilities using the Stata margins procedure.

Table 5: Summary of main results, by level of qualification (adjusted)

Level of study	Number of graduates	Of all 2003 graduates, % who left NZ 2004–10	Of 2003 graduates who left in 2004–05, % back in NZ in years 4 and 5	Of all 2003 graduates, % abroad 2008–10
Level 1–3 certificates	14,010	18.7	23.6	10.6
Level 4 certificates	5,316	22.0	24.3	12.6
Level 5–7 diplomas	4,755	23.4	31.8	12.5
Level 7 bachelors/grad	11,673	30.7	26.5	17.6
Level 8 honours/postgrad	3,048	35.3	22.7	21.9
Level 9 masters	1,467	34.3	22.3	21.3
Level 10 doctorate	354	48.1	16.7	34.9
All levels	40,623	25.9	25.6	15.1

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ. They have been adjusted to take account of differences between graduates in terms of age, young completer status, sex, ethnicity, leaving student loan amount. Return rates were also adjusted for whether the plane disembarked in Australia or not. See tables A4–A6 for the full set of results.

The likelihood that a 2003 graduate left New Zealand over the following seven years is strongly associated with the level of their qualification. The probability of leaving increases with level, from 18.7 percent for those graduating with a level 1–3 certificate to 48.1 percent of those graduating with a doctorate.

The relationship between qualification level and the likelihood of return after four years is weaker. This may be partly due to data limitations, primarily not being able to observe graduate migration patterns beyond 2010. From what we could observe, the probability of return was above average for those with level 5–7 diplomas and below average for those with doctorates.

The proportion of 2003 graduates that were abroad in 2010, and had been for at least three years, is strongly related to level. This makes sense given that the likelihood of leaving New Zealand is also strongly related to level. The proportion of graduates that were abroad, through 2008 to 2010, increases from 10.6 percent for those with level 1–3 certificates to over one third of those with doctorates.

Figures 10 to 12 display these results graphically. They include 95 percent confidence intervals to help give an indication of the reliability of the results. While we are able to precisely estimate the likelihood of leaving or still being abroad by level, the estimates on the likelihood of return are not as reliable, because of the smaller number graduates that we could observe returning over the study period. Thus we are less certain that this pattern of return by level would hold if we could observe migration patterns beyond 2010 or migration patterns from graduates from a year other than 2004.

Figure 10: The proportion of 2003 graduates who left New Zealand over 2004–10



Figure 11: The proportion of 2003 graduates who left New Zealand in 2004–05, that were back in New Zealand in years four and five after leaving



Figure 12: The proportion of 2003 graduates that were abroad through 2008–10



Table 6 summarises the same set indicators, without controlling for other variables. Comparing the two tables shows that in terms of leaving, and in terms of being abroad through 2008-10, level 1-3 and 4 certificates and doctorates have had their proportions adjusted upwards, while bachelors/graduate and honours/postgraduate qualifications have had their proportions adjusted downwards. This is mainly reflecting the impact of controlling for age, graduates of the first group tend to be older than average, graduates of the second group tend to be younger, and younger graduates are more likely to leave.

Table 6: Summary of main results, by level of qualification (unadjusted)

Level of study	Number of graduates	Of all 2003 graduates, % who left NZ 2004-10	Of 2003 graduates who left in 2004-05, % back in NZ in years 4 and 5	Of all 2003 graduates, % abroad 2008-10
Level 1-3 certificates	14,010	14.2	24.2	8.2
Level 4 certificates	5,316	16.9	24.7	9.8
Level 5-7 diplomas	4,755	23.8	33.6	12.6
Level 7 bachelors/grad	11,673	39.2	25.8	22.7
Level 8 honours/postgrad	3,048	41.4	24.0	25.9
Level 9 masters	1,467	34.2	19.5	22.1
Level 10 doctorate	354	42.4	17.2	30.5
All levels	40,623	25.9	25.6	15.1

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

5.2 Field of study

Tables A7-A10 show the regression results for each of our three key measures by field of study. We look at field of study for each level of qualification separately, as what each field represents varies substantially across levels. Table 7 summarises results from the regressions on the proportion of graduates that were still abroad through 2008-10, controlling for the full set of covariates that we could observe. These results, along with the corresponding 95 percent confidence intervals, are also displayed graphically in figure 13 at the end of this section.

There was not much variation by field of study in the proportion of 2003 graduates abroad through 2008-10, especially for those with a level 1-3 certificate or a level 4-7 certificate or diploma. There was more variation for those graduates with bachelors or postgraduate qualifications, with graduates in architecture and building being more likely to be abroad through 2008-10, and graduates in agriculture, environmental and related studies being less likely to be abroad. Those with bachelors degrees in education were also less likely to be abroad. Most other fields of study were grouped around the average – between 20-25 percent for bachelors graduates and between 20 and 30 percent for those with postgraduate qualifications.

Table 7: The proportion of 2003 graduates abroad through 2008–10, by level of qualification

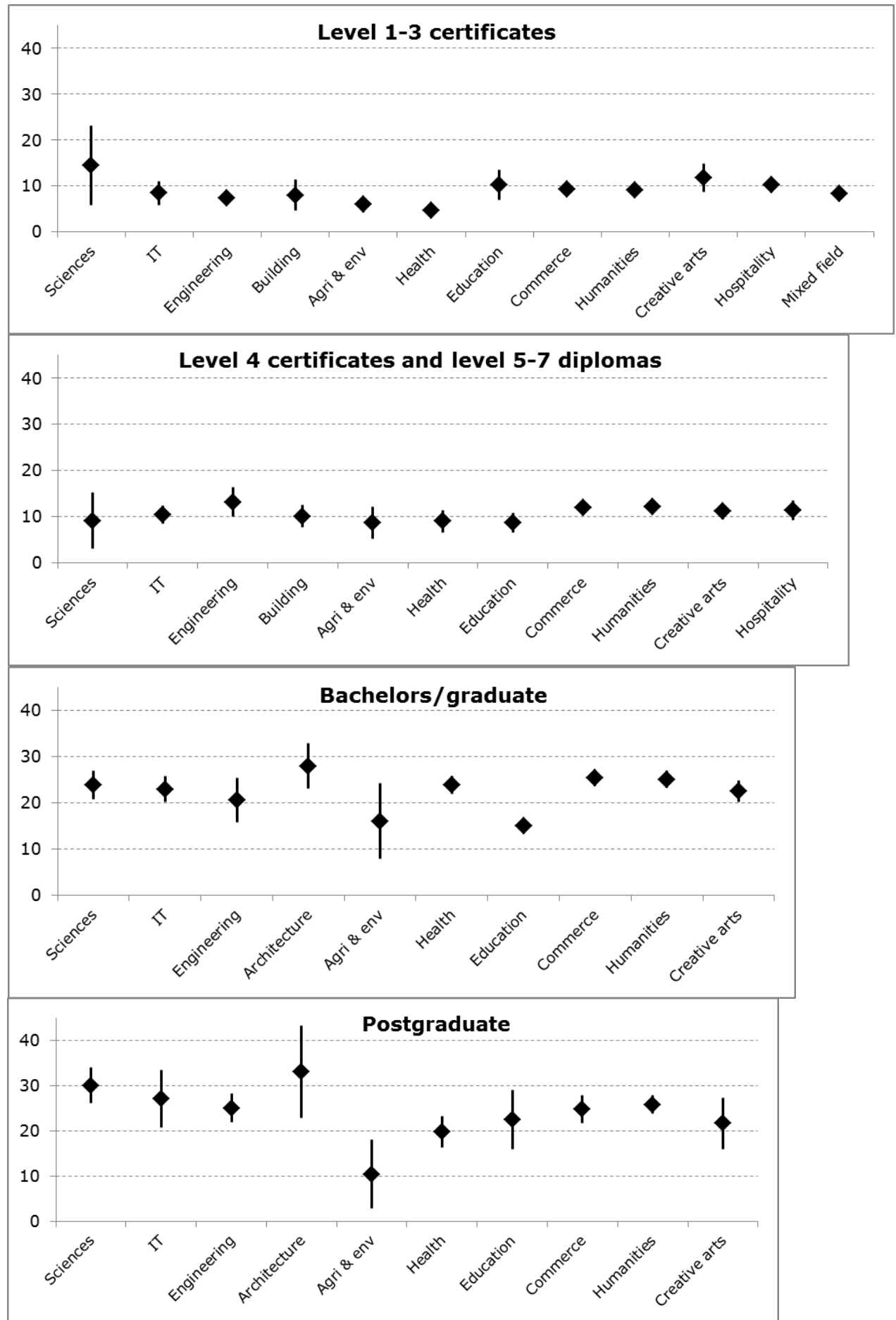
Field of study	Of all 2003 graduates, % abroad 2008–10 Level 1–3	Of all 2003 graduates, % abroad 2008–10 Level 4–7	Of all 2003 graduates, % abroad 2008–10 Bachelors/grad	Of all 2003 graduates, % abroad 2008–10 Postgraduate
01 Natural and Physical Sciences	14.5	9.2	23.9	30.1
02 Information Technology	8.4	10.5	23.0	27.2
03 Engineering & Related Techs	7.3	13.2	20.6	25.1
04 Architecture and Building	8.0	10.1	28.0	33.1
05 Agriculture, Env. & Related	5.9	8.7	16.1	10.5
06 Health	4.7	9.0	23.9	19.8
07 Education	10.3	8.7	15.1	22.6
08 Management and Commerce	9.3	11.9	25.4	24.9
09 Society and Culture	9.1	12.2	25.1	25.9
10 Creative Arts	11.7	11.2	22.6	21.7
11 Food, Hospitality & Personal	10.2	11.4	...	...
12 Mixed Field Programmes	8.3	...	...	...
All fields	8.2	11.2	22.7	25.1

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ. They have been adjusted to take account of differences between graduates in terms of age, young completer status, sex, ethnicity, leaving student loan amount. See tables A7-A10 for the full set of results.

Looking at a more detailed breakdown of qualifications, there were some qualifications where between a third and 40 percent of 2003 graduates were abroad through 2008-10, as shown in tables A11 and A12. Many of these specialised qualifications were in science, technology, engineering and mathematics (STEM). These included postgraduate qualifications in mathematical sciences; earth sciences; biological sciences; computer science; civil engineering; mechanical and industrial engineering, and electrical and electronic engineering. Other fields where over a third of 2003 graduates were abroad included postgraduate degrees in architecture and law and bachelor degrees in dental studies, pharmacy, and economics and econometrics.

Many of these specialised qualifications with high proportion abroad were held by small numbers of graduates, which means that our estimates lack precision. This can be seen in their relatively high standard errors. Therefore, we cannot be confident that future graduates in these qualifications will be abroad at similar rates. In addition, when we control for differences between the characteristics of different graduates, our estimates of the proportions abroad in these specialised qualifications decrease. This is because graduates in these fields of study tend to have other characteristics that increase the likelihood of being abroad. In particular, graduates in these specialised qualifications are younger than graduates in other fields at the same level. Ethnicity and sex also play a (smaller) role in increasing the probability of graduates in these specialised qualifications being abroad.

Figure 13: The proportion of 2003 graduates abroad through 2008–10, by level



5.3 Other characteristics

Age

The age of the graduate had a large and significant impact on the probability of them leaving New Zealand and still being abroad through 2008–10. The likelihood of being abroad decreases with age, with those aged between 20 and 24 years when completing their qualification more likely to be abroad seven years later than any other age group. Around, 20.5 percent of this group was abroad through 2008–10, around 4 percentage points more than those aged 17–20 or 25–29 years, around 9–10 percentage points more than 30–39 year olds, and 13–16 percentage points more than those aged over 40 years. This age effect increases with the level of qualification, perhaps reflecting that going on OE is more likely for graduates in higher level qualifications.

Age appears much less significant in explaining the likelihood of return. Given that younger graduates are more likely to leave because they are going on OE or working holidays, it may be expected that they would be more likely to return. That we cannot observe this may be due to limitations with the data, in particular our inability to see whether graduates return to New Zealand beyond 2010. In addition, the probability of return may also be influenced by a wide range of factors that are not age related (and are not captured in our dataset) such as relative economic opportunities, or the pull and push of personal relationships, in New Zealand and abroad.

Sex

Being female significantly reduced the probability of being abroad through 2008–10. The effect was relatively small, with 16.6 percent of males abroad through 2008–10 compared to 14.0 percent of females, a difference of 2.6 percentage points. The effect was larger at the postgraduate level, where the difference was 5.0 percentage points. Female graduates were generally less likely to leave New Zealand, and more likely to return.

Ethnicity²³

Asians (at 24.7 percent) and those in the 'Other' ethnic group (at 24.4 percent) were around 10 percentage points more likely to be abroad through 2008–10 than other ethnic groups. This effect was significant across all levels. These groups tended to be more likely to leave New Zealand, and substantially less likely to return.

Ethnicity was the only variable whose impact on return seemed greater than that on leaving. This is especially true for Asian and the 'Other' ethnic groups, who are

²³ The tertiary education administrative data recorded up to three ethnicities for each student. For the regression analysis in this report, students with multiple ethnicities were prioritised to a single ethnicity using the Statistics NZ's old prioritisation rule. The two largest multiple ethnicity groups (European-Māori and European-'Other') were retained for the regression analysis.

around 20 percentage points less likely to return to New Zealand in years four and five after leaving than Europeans. It is likely that ethnicity is picking up other influences, such as the extent of overseas family connections and whether someone can legally live outside of New Zealand and Australia for extended periods. Note that our analysis excludes international students and those domestic students who spent an extended period overseas using a non-New Zealand passport before study. Even so, it is likely that our results partially reflect first generation immigrants returning home.

Māori graduates were generally less likely to leave than Europeans, but those that did leave were generally less likely to return. This is, at first glance, a surprising result. However, there may be reasons for this, especially for those that left for Australia. Hamer (2007) presents survey results on why a sample of Māori moved to, and remained in, Australia. Reasons given include joining whānau across the Tasman, and the desire to escape negative experiences in New Zealand.

Port of disembarkation

As previously discussed, another data limitation was the inability to identify the final destination for departures from New Zealand – we could only observe where the plane landed. We simplified this information into an ‘Australia’ or ‘rest of the world’ variable. Although this is limiting, this variable still had a large association with the likelihood of return. Departing graduates whose plane landed in Australia were 7 percentage points less likely to return to New Zealand in years four and five after leaving than those whose plane landed elsewhere (22.3 percent versus 30.7 percent). We would expect this type of difference given that it is easier for New Zealanders to stay for extended periods in Australia than other countries. The difference decreased with level from around 13-14 percentage points at levels 1–3 and 4–7, to 5-6 percentage points at the bachelors and postgraduate level.

Student loan leaving balance

The student loan balance at the time of graduation was positively associated with the likelihood of being abroad through 2008–10, though the effect was relatively small and could have been reflecting other differences in graduates that we could not control for. Compared to someone who completed their qualification with no debt²⁴, of whom 12.9 percent were abroad though 2008-10, those with a \$1 to \$10,000 loan had a 2.8 percentage point greater probability of being abroad, those with a \$10,000-\$20,000 loan had a 2.7 percentage point greater probability and those with an over \$20,000 loan had a 4.6 percentage point difference.

²⁴ Our approach to defining student loan bands differs from the official approach used by the Ministry of Education. They do not define those with a balance of less than \$20 as having a student loan, as balances below this level are written off on 31 March each year under the small balance provision of the Student Loan Scheme Amendment Act 2007.

6 CONCLUSION

This report presents new descriptive statistics on the extent that domestic tertiary graduates leave New Zealand, and the extent to which they return again. It examines the migration outcomes through to 2010 of New Zealand students who completed a tertiary qualification in 2003.

More than a quarter (25.9 percent) of 2003 domestic tertiary graduates left New Zealand between 2004 and 2010 for a year or more. Of those who left in 2004 or 2005, around a quarter (25.6 percent) had returned to New Zealand four years later. Of all 2003 graduates, 15.1 percent were abroad in 2010 and had been abroad for at least three years.

The likelihood that a 2003 graduate left New Zealand over the following seven years is strongly associated with the level of their qualification. The relationship between qualification level and the probability of return after four years was weaker. This may be partly due to data limitations, primarily not being able to observe graduate migration patterns beyond 2010. The proportion of 2003 graduates that were still abroad in 2010, and had been for at least three years, is strongly related to level. This makes sense given that the likelihood of leaving New Zealand is also strongly related to level. The proportion of graduates that were abroad, through 2008 to 2010, increases from 10.6 percent of those with level 1–3 certificates to over one third of those with doctorates.

Graduates in bachelor and postgraduate qualifications tended to go overseas straight after graduation or after a few years in the workforce. In comparison, graduates in lower level qualifications tended to leave at a more consistent rate over the seven year period. In doing so they are behaving more like the overall New Zealand population.

The proportion of graduates abroad through 2008–10 is our key indicator. It summarises the result of the leaving and returning decisions made by our 2003 graduates and it is as close as we can get, given the available data, to answering the question of interest – which type of graduate was more likely to leave New Zealand permanently. However, there are reasons to believe that a number of the graduates that are abroad through 2008–10 may subsequently return. Trends over time suggest that the proportion of younger 2003 graduates out of New Zealand peaked in 2009, although this may reflect the impact of the global financial crisis. Research from the longitudinal Dunedin Study in 2001 indicated that most young New Zealanders overseas intended to return.

There was not much variation by field of study in the proportion of 2003 graduates abroad through 2008–10, especially for those with a level 1–3 certificate or a level 4–7 certificate or diploma. There was more variation for those graduates with bachelors or postgraduate qualifications, with graduates in architecture and building being more likely to be abroad through 2008–10, and graduates in agriculture, environmental and related studies being less likely to be abroad. Those with bachelors degrees in education were also less likely to be abroad. Most other fields of study were grouped around the average – between

20 and 25 percent abroad for bachelors graduates, and between 20 and 30 percent abroad for those with postgraduate qualifications.

Looking at a more detailed breakdown of qualifications, there were some qualifications where between a third and 40 percent of 2003 graduates were abroad through 2008–10. Many of these specialised qualifications were in science, technology, engineering and mathematics (STEM). These included postgraduate qualifications in mathematical sciences; earth sciences; biological sciences; computer science; civil engineering; mechanical and industrial engineering, and electrical and electronic engineering. Other fields where over a third of 2003 graduates were still away included postgraduate degrees in architecture and law and bachelor degrees in dental studies, pharmacy, and economics and econometrics.

Many of these specialised qualifications with a high proportion abroad were held by small numbers of graduates, which means that our estimates lack precision. We cannot therefore be confident that future graduates in these qualifications will be abroad at similar rates. In addition, when we control for differences between the characteristics of different graduates, our estimates of the proportions abroad in these specialised qualifications decrease. This is because graduates in these fields of study tend to have other characteristics that increase the likelihood of being abroad. In particular, graduates in these specialised qualifications are younger than graduates in other fields at the same level.

There are other characteristics that affect the migration patterns of graduates. The age of the graduate had a large and significant impact on the probability of them leaving New Zealand and still being abroad through 2008–10. The likelihood of being abroad decreases with age, with those aged between 20 and 24 years when completing their qualification more likely to be abroad seven years later than any other age group. This age effect increases with the level of qualification, perhaps reflecting that going on OE is more likely for graduates in higher level qualifications.

Age appears much less significant in explaining the likelihood of return. Given that younger graduates are more likely to leave because they are going on OE or working holidays, it may be expected that they would be more likely to return. That we cannot observe this may be due to limitations with the data, in particular our inability to see whether graduates return to New Zealand beyond 2010. In addition, the probability of return may also be influenced by a wide range of factors that are not age related, such as relative economic opportunities, or the pull and push of personal relationships in New Zealand and abroad.

Being female significantly reduced the probability of being abroad through 2008–10. The effect was relatively small, with 16.6 percent of males abroad through 2008–10 compared to 14.0 percent of females, a difference of 2.6 percentage points. The effect was larger at the postgraduate level, where the difference was 5.0 percentage points. Female graduates were generally less likely to leave New Zealand, and more likely to return.

Asians and those in the 'Other' ethnic group were more likely to be abroad through 2008–10 than Europeans. This effect was significant across all levels. These groups tended to be more likely to leave New Zealand, and substantially less likely to return. Māori graduates were generally less likely to leave than Europeans, but those that did leave were less likely to return.

Ethnicity was the only variable whose impact on return seemed greater than that on leaving. It is likely that ethnicity is picking up other influences, such as the extent of overseas family connections and whether someone can legally live outside of New Zealand and Australia for extended periods. Note that our analysis excludes international students and those domestic students who spent an extended period overseas using a non-New Zealand passport before study. Even so, it is likely that our results partially reflect first generation immigrants returning home.

We could not identify the final destination for departures from New Zealand, only where their plane had landed. We simplified this information into an 'Australia' or 'rest of the world' variable. Although this is limiting, this variable still had a large association with the likelihood of return. Departing graduates whose plane landed in Australia were 7 percentage points less likely to have returned to New Zealand after four years than those whose plane landed elsewhere (22.3 percent versus 30.7 percent). We would expect this type of difference given that it is easier for New Zealanders to stay for extended periods in Australia than other countries. The difference decreased with level from around 13-14 percentage points at levels 1–3 and 4–7, to 5-6 percentage points at the bachelors and postgraduate level.

Around 60 percent of graduate departures landed in Australia, compared to 70 percent of all New Zealand departures aged 17 to 59 years. Across all age groups, with the exception of the 17–20 year olds, graduate departures were less likely to land in Australia than New Zealand departures in general. The likelihood of graduate departures leaving for Australia generally decreases with the level of their qualification, from 79 percent for level 1–3 certificates to 42 percent for doctorates.

The student loan balance at the time of graduation was positively associated with the probability of being abroad through 2008–10, though the effect was relatively small and could have been reflecting other differences in graduates that we could not control for.

Our results are broadly consistent with what is already known about emigration by New Zealanders. Like official statistics on PLT departures we see that younger people are far more likely to leave than older New Zealanders. PLT statistics show that departures to Australia tend to be lower skilled, based on occupation, than other emigrants, and we find a similar pattern for graduates in terms of qualifications. We too see a dip in departures from New Zealand at the start of the global financial crisis.

Like Smyth and Spackman (2012) and Smart (2006) we find that younger students and those who had studied at higher levels were more likely to be overseas. Like Smart (2006) we find that the student loan leaving balance was positively associated with the likelihood of being abroad, and that borrowers that studied in the fields of agriculture, environmental and related studies and education were less likely to be overseas. Similar to Smart (2011), we find that Asian graduates in postgraduate qualifications, and those with postgraduate qualifications in natural and physical sciences were more likely to be abroad. There is also an overlap in the Australian industries that Haig (2012) found to have lower shares of New Zealanders (education and training, and agriculture, forestry and fishing), and the fields of study that we found were less likely to leave New Zealand.

There are two key limitations to our analysis. The first is not being able to observe international movements beyond 2010. Because of this, our indicators on those who have left are likely to be more robust than our indicators of return. Second, our analysis is also missing many variables that are likely to help explain people's migration decisions, including comparisons of economic opportunities in New Zealand and abroad, the level of international risk (eg the impact of the global financial crisis), the influence of peers, the pull and push of personal relationships in New Zealand and abroad, and the extent that some graduates can live in countries for extended periods due to where they, or their parents, were born.

Our population of 2003 tertiary graduates could be followed up in five years, to see the extent to which they have returned to New Zealand. The approach used in this paper could also be extended to participants in industry training and modern apprenticeships. It is also possible to look at the extent that international students stay in New Zealand after completing their studies and the extent that their skills replace those of New Zealand tertiary graduates that leave. The proposed integration of arrival and departure card data into the IDI will make it easier to compare the skills that are lost and gained through migration across the entire working age population.

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TABLES

Table A1: How different student populations compare

Students who left study in 2003	Total	Matched to IDI	Matched to IDI %	Mean years abroad	Years abroad 75th percentile	Years abroad 90th percentile	Abroad in 2010 %	Abroad every year %	Never abroad %
All students	156,615	148,086	94.6%	0.8	0	4	14.8%	3.8%	80.3%
NZ only	147,852	139,326	94.2%	0.7	0	3	13.5%	3.2%	81.5%
Completers only	45,327	43,227	95.4%	1.1	1	5	20.0%	5.2%	73.1%
Young only	45,051	43,863	97.4%	1.3	2	5	24.2%	5.3%	66.2%
Populations used in this report									
NZ completers	42,723	40,623	95.1%	1.0	1	5	18.8%	4.5%	74.1%
NZ young completers	17,064	16,743	98.1%	1.7	3	6	30.7%	6.7%	56.6%
NZ IDI population (aged 17–59)	2,094,591	N/A	N/A	0.4	0	1	8.4%	1.4%	89.0%

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3. 'NZ only' excludes those students that spent an extended period of time outside of New Zealand before 2003 on an overseas passport. 'Completers only' excludes those students that did not complete a qualification. 'Young only' excludes older students that did not meet our definition of a young student at each level. 'NZ completers' excludes both those who spent an extended period of time outside of New Zealand before 2003 on an overseas passport and those who did not complete their qualification. This is our main population used in this study. 'NZ young completers' also excludes older students that did not meet our definition of a young student at each level. The 'NZ IDI population' are those people who received a taxable income in the 2004 tax year who were aged 17–59.

Table A2: Summary statistics for the 'NZ completers' population

Characteristic	Count	% that left 2004–10	% that left and abroad > 2 years	% that left for Australia	% of leavers that were back in NZ in yr2	% of leavers that were back in NZ in yrs4+5	% abroad 2008–10
All – 'NZ completers'	40,623	25.9	18.7	59.3	19.1	25.6	15.1
Level of study							
Level 1–3 certificates	14,010	14.2	9.6	79.1	18.8	24.2	8.2
Level 4 certificates	5,316	16.9	11.5	77.0	17.0	24.7	9.8
Level 5–7 diplomas	4,755	23.8	16.0	61.6	24.0	33.6	12.6
Level 7 bachelors/grad	11,673	39.2	28.7	51.2	20.6	25.8	22.7
Level 8 honours/postgrad	3,048	41.4	32.5	48.2	14.6	24.0	25.9
Level 9 masters	1,467	34.2	26.8	50.9	12.7	19.5	22.1
Level 10 doctorates	354	42.4	38.1	42.0	8.1	17.2	30.5
Sex							
Level 1–3 certificates							
Female	7,512	13.2	9.1	78.8	18.3	25.4	7.7
Male	6,498	15.5	10.1	79.4	19.0	23.0	8.6
Level 4–7							
Female	6,087	17.7	11.7	68.0	23.4	31.1	9.7
Male	3,984	24.0	16.4	69.0	17.7	29.2	13.4
Level 7 bachelors/grad							
Female	7,440	36.3	26.5	51.1	21.9	28.4	20.4
Male	4,230	44.5	32.7	51.4	18.7	22.2	26.7
Postgraduate							
Female	2,664	35.0	27.9	50.2	16.0	28.1	21.6
Male	2,205	44.5	35.1	46.5	11.4	15.5	29.3
Age group							
Level 1–3 certificates							
17–20	2,721	26.2	15.8	83.2	23.5	26.7	13.2
20–24	2,022	24.6	16.8	77.7	20.3	22.6	14.1
25–29	1,500	15.4	11.0	74.0	17.5	24.1	9.0
30–34	1,551	10.1	7.4	78.8	12.2	20.0	6.6
35–39	1,545	8.5	6.2	86.4	11.1	S	5.6
40–49	2,532	6.3	4.7	75.5	9.8	22.2	4.3
50–59	1,482	5.1	3.8	72.0	14.3	S	3.0
Level 4–7							
17–20	1,812	30.6	18.7	73.5	24.6	31.9	15.2
20–24	2,043	33.8	22.2	62.6	26.3	35.5	16.9
25–29	1,233	24.3	18.7	63.0	13.4	26.1	16.1
30–34	1,182	14.0	9.9	76.4	14.6	22.7	8.9
35–39	1,017	10.6	8.6	75.0	7.4	S	7.4
40–49	1,740	8.6	5.9	72.0	13.5	22.2	5.0
50–59	834	6.1	4.3	76.5	S	S	3.6

Characteristic	Count	% that left 2004–10	% that left and abroad > 2 years	% that left for Australia	% of leavers that were back in NZ in yr2	% of leavers that were back in NZ in yrs4+5	% abroad 2008–10
Level 7 bachelors/grad							
17–20	93	35.5	32.3	S	S	S	22.6
20–24	6,738	52.7	38.2	49.4	21.6	26.3	29.9
25–29	1,443	34.5	26.6	51.8	17.3	23.6	20.8
30–34	909	23.8	17.8	63.9	13.0	25.9	14.9
35–39	717	15.1	12.1	69.4	10.7	S	10.5
40–49	1,278	10.6	7.5	60.0	22.2	29.4	6.3
50–59	447	8.7	6.0	S	S	S	4.0
Postgraduate							
20–24	1,908	61.3	49.1	46.7	13.8	19.4	39.2
25–29	837	42.7	32.3	47.9	14.9	25.0	25.8
30–34	582	23.7	20.1	47.8	11.8	34.8	14.9
35–39	453	22.5	18.5	58.8	15.4	S	15.9
40–49	732	13.9	11.1	58.8	12.5	S	9.8
50–59	327	11.0	8.3	S	S	S	6.4
Field of Study							
Level 1–3 certificates							
Agriculture, Env. & Related	633	16.6	9.5	85.7	30.8	S	7.1
Architecture & Building	177	20.3	11.9	S	S	S	10.2
Creative Arts	378	21.4	14.3	74.1	22.7	S	13.5
Education	549	11.5	7.7	66.7	23.5	S	6.0
Engineering & Related	1,125	19.7	11.5	82.4	17.6	29.4	10.1
Food, Hospitality, Personal	1,233	25.8	17.3	79.2	18.1	23.5	14.6
Health	3,285	5.8	3.8	81.3	22.4	22.7	3.2
Information Technology	429	14.7	10.5	71.4	S	S	9.1
Management & Commerce	2,814	15.6	10.4	78.8	18.0	24.4	9.1
Mixed Field Programmes	2,007	10.3	7.8	89.9	12.1	9.1	7.3
Natural & Physical Sciences	75	28.0	20.0	S	S	S	16.0
Society & Culture	1,434	20.1	14.4	71.9	18.8	29.3	11.1
All - Level 1–3	14,010	14.2	9.6	79.1	18.8	24.2	8.2
Level 4–7							
Agriculture, Env. & Related	276	20.7	12.0	63.2	S	S	7.6
Architecture & Building	534	24.2	15.2	72.1	20.0	S	11.8
Creative Arts	1,281	28.1	17.8	67.5	23.9	36.6	14.3
Education	906	14.2	8.9	51.2	28.6	42.1	6.3
Engineering & Related	366	27.0	21.3	60.6	17.2	S	17.2
Food, Hospitality, Personal	705	26.0	17.0	77.0	21.6	23.8	14.0
Health	678	16.4	10.2	73.0	27.6	S	8.4
Information Technology	828	23.2	15.6	67.2	16.7	22.7	14.1
Management & Commerce	1,920	22.3	14.5	67.1	23.7	26.4	12.2
Natural & Physical Sciences	162	22.2	14.8	S	S	S	11.1
Society & Culture	2,793	14.9	11.0	69.8	16.7	30.5	8.9
All - Level 4–7	10,071	20.2	13.6	68.5	21.0	30.1	11.2

Characteristic	Count	% that left 2004–10	% that left and abroad > 2 years	% that left for Australia	% of leavers that were back in NZ in yr2	% of leavers that were back in NZ in yrs4+5	% abroad 2008–10
Level 7 bachelors/grad							
Agriculture, Env. & Related	102	35.3	23.5	S	S	S	20.6
Architecture & Building	276	54.3	42.4	46.0	15.9	26.3	32.6
Creative Arts	1,233	44.5	31.1	47.5	24.8	24.6	24.6
Education	2,571	22.4	15.1	44.3	27.1	39.3	11.1
Engineering & Related	252	47.6	34.5	57.5	20.0	S	27.4
Health	1,920	38.4	29.7	70.7	18.3	23.6	23.0
Information Technology	894	41.6	30.2	48.4	16.7	16.0	26.5
Management & Commerce	2,349	50.7	36.4	47.9	20.1	25.8	29.4
Natural & Physical Sciences	705	46.0	34.5	52.8	18.9	20.8	28.1
Society & Culture	2,364	43.7	33.0	45.1	19.0	26.2	25.8
All – Bachelors/grad	11,673	39.2	28.7	51.2	20.6	25.8	22.7
Postgraduate							
Agriculture, Env. & Related	72	33.3	20.8	S	S	S	16.7
Architecture & Building	72	45.8	41.7	S	S	S	37.5
Creative Arts	207	31.9	26.1	54.5	15.8	S	20.3
Education	273	19.8	16.5	55.6	S	S	12.1
Engineering & Related	579	58.0	44.6	46.4	12.5	12.2	37.8
Health	750	23.6	17.6	64.4	17.4	27.6	12.8
Information Technology	186	43.5	33.9	44.4	10.0	S	30.6
Management & Commerce	882	31.3	24.1	51.1	12.7	26.7	20.7
Natural & Physical Sciences	471	52.9	43.3	50.6	11.6	20.8	35.0
Society & Culture	1,689	42.8	35.2	44.0	14.2	27.3	27.2
All - Postgraduate	4,869	39.3	31.2	48.3	13.7	21.8	25.1

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3. 'S' indicates that data has been suppressed for quality or confidentiality reasons.

Table A3: Summary statistics for the 'NZ young completers' population

	Count	% that left 2004-10	% that left and abroad > 2 years	% that left for Australia	% of leavers that were back in NZ in yr2	% of leavers that were back in NZ in yrs4+5	% abroad 2008-10
All - 'NZ young completers'	16,743	43.4	30.9	56.0	20.7	25.9	24.5
Level of study							
Level 1-3 certificates	3,678	26.1	15.9	82.8	23.8	29.1	13.4
Level 4 certificates	1,437	29.0	18.2	74.8	22.6	32.4	14.8
Level 5-7 diplomas	1,896	35.0	22.2	63.8	27.3	35.0	17.1
Level 7 bachelors/grad	7,290	52.1	37.9	49.4	21.3	26.0	29.6
Level 8 honours/postgrad	1,722	60.8	48.1	46.7	14.5	21.7	38.2
Level 9 masters	600	53.0	42.5	47.2	12.2	15.4	35.5
Level 10 doctorates	117	56.4	51.3	40.9	S	S	38.5
Sex							
Level 1-3 certificates							
Female	1,812	25.2	16.1	80.3	23.8	28.0	13.4
Male	1,869	27.1	15.7	84.6	23.8	27.0	13.3
Level 4-7							
Female	1,854	31.6	19.9	66.2	27.3	36.9	15.5
Male	1,479	33.5	21.1	70.3	22.8	29.4	16.8
Level 7 bachelors/grad							
Female	4,473	50.4	36.7	49.3	22.8	28.1	28.0
Male	2,817	54.7	39.8	49.4	19.3	22.5	32.2
Postgraduate							
Female	1,275	55.3	43.5	48.5	16.1	28.0	33.9
Male	1,164	62.4	50.3	45.0	10.5	12.9	41.2
Field of Study							
Level 1-3 certificates							
Agriculture, Env. & Related	234	26.9	14.1	90.5	41.2	S	11.5
Architecture & Building	105	25.7	14.3	S	S	S	14.3
Creative Arts	162	29.6	18.5	S	S	S	16.7
Education	39	S	S	S	S	S	S
Engineering & Related Techs	618	24.3	12.1	84.0	19.4	S	11.2
Food, Hospitality, Personal	789	29.3	19.4	81.8	18.0	18.2	16.7
Health	342	19.3	11.4	90.9	23.5	S	9.6
Information Technology	90	26.7	13.3	S	S	S	13.3
Management & Commerce	675	26.2	15.6	84.7	26.7	S	12.4
Mixed Field Programmes	216	16.7	12.5	S	S	S	9.7
Natural & Physical Sciences	12	S	S	S	S	S	S
Society & Culture	438	32.2	21.9	74.5	25.0	33.3	15.8
All - Level 1-3	3,678	26.1	15.9	82.8	23.8	29.1	13.4
Level 4-7							
Agriculture, Env. & Related	99	27.3	15.2	S	S	S	9.1
Architecture & Building	255	31.8	17.6	70.4	22.2	S	12.9
Creative Arts	690	34.3	20.9	70.9	29.0	44.4	16.1
Education	138	34.8	19.6	S	S	S	8.7
Engineering & Related Techs	177	30.5	20.3	61.1	S	S	18.6
Food, Hospitality, Personal	447	32.2	19.5	75.0	28.9	S	16.1
Health	165	34.5	18.2	78.9	S	S	12.7
Information Technology	333	27.9	17.1	67.7	17.4	S	15.3
Management & Commerce	762	34.3	22.0	64.4	28.8	31.0	17.7
Natural & Physical Sciences	60	40.0	25.0	S	S	S	15.0
Society & Culture	396	35.6	25.8	61.7	20.0	36.4	19.7
All - Level 4-7	3,333	32.4	20.5	67.8	25.7	34.2	16.1

	Count	% that left 2004-10	% that left and abroad > 2 years	% that left for Australia	% of leavers that were back in NZ in yr2	% of leavers that were back in NZ in yrs4+5	% abroad 2008-10
Level 7 bachelors/grad							
Agriculture, Env. & Related	72	41.7	29.2	S	S	S	25.0
Architecture & Building	213	60.6	47.9	44.2	15.0	27.8	36.6
Creative Arts	978	51.2	35.3	46.7	26.2	24.1	27.9
Education	1,077	37.3	24.2	40.3	29.4	44.7	17.3
Engineering & Related Techs	192	53.1	39.1	55.9	S	S	31.3
Health	1,098	53.0	40.7	69.1	18.8	24.2	30.9
Information Technology	606	50.5	35.6	46.1	17.9	15.4	31.2
Management & Commerce	1,782	58.9	42.1	46.0	20.9	25.2	34.0
Natural & Physical Sciences	534	55.1	41.6	54.1	18.4	20.0	33.1
Society & Culture	1,575	55.2	41.9	44.5	18.9	26.4	32.2
All - Bachelors	7,290	52.1	37.9	49.4	21.3	26.0	29.6
Postgraduate							
Agriculture, Env. & Related	39	S	S	S	S	S	S
Architecture & Building	42	S	S	S	S	S	S
Creative Arts	99	54.5	39.4	50.0	S	S	30.3
Education	48	S	S	S	S	S	S
Engineering & Related Techs	498	63.3	49.4	45.7	11.1	S	41.0
Health	168	51.8	41.1	58.6	20.0	S	25.0
Information Technology	102	55.9	44.1	47.4	S	S	38.2
Management & Commerce	276	56.5	43.5	48.1	11.4	S	37.0
Natural & Physical Sciences	330	62.7	50.0	50.7	13.6	19.5	40.0
Society & Culture	987	58.4	47.7	43.2	14.0	26.2	36.5
All - Postgraduate	2,439	58.8	46.9	46.9	13.5	20.4	37.4

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3. 'S' indicates that data has been suppressed for quality or confidentiality reasons.

Table A4: Marginal effects from logistic regressions modelling the probability of leaving between 2004 and 2010

Characteristic	A. No controls			B. Some controls			C. Full model		
	ME	Sig	SE	ME	Sig	SE	ME	Sig	SE
Level of study (reference = level 1–3 certificates)									
Level 4 certificates	2.7	***	0.6	3.6	***	0.7	3.3	***	0.7
Level 5–7 diplomas	9.6	***	0.7	6.6	***	0.7	4.7	***	0.7
Level 7 bachelors/grad	25.0	***	0.5	16.7	***	0.6	12.0	***	0.7
Level 8 honours/postgrad	27.2	***	0.9	21.0	***	0.9	16.6	***	0.9
Level 9 masters	19.9	***	1.3	21.4	***	1.2	15.6	***	1.3
Level 10 doctorates	27.9	***	2.6	35.6	***	2.4	29.4	***	2.5
Sex (reference = males)									
Females				-3.9	***	0.4	-3.7	***	0.4
Age group (reference = 20–24 years)									
Under 20 years				-4.0	***	0.9	-5.2	***	0.9
25–29 years				-14.4	***	0.7	-8.8	***	1.0
30–34 years				-24.1	***	0.7	-16.4	***	1.1
35–39 years				-27.5	***	0.7	-20.1	***	1.1
40–49 years				-31.0	***	0.6	-23.9	***	1.0
50 years and over				-33.1	***	0.6	-26.4	***	1.0
Young completer? (reference = no)									
Yes							6.2	***	0.9
Ethnic group (reference = European)									
Māori							-1.8	***	0.7
Pacific peoples							-0.8		1.0
Asian							7.8	***	0.9
Other ethnic groups							8.2	***	1.5
European–Māori							-2.7	***	0.9
European–Other ethnic groups							4.6	***	1.1
Leaving student loan amount (reference = \$0.00)									
\$0.01–\$10,000							2.9	***	0.6
\$10,000–\$20,000							3.8	***	0.6
\$20,000 and over							5.9	***	0.6
No. of obs.	40,623			40,623			40,623		
No. of obs. leaving	10,518			10,518			10,518		
Adjusted R2	0.0605			0.1478			0.1543		
Model prediction correctly	74.1%			75.8%			76.4%		
Sensitivity (true positive)	0.0%			25.3%			34.6%		
Specificity (true negative)	100.0%			93.4%			90.9%		

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: Marginal effects (ME) and standard errors (SE) have been multiplied by 100 to represent the percentage point estimate (and associated error) of the effect of switching from the omitted reference group. *** means statistically significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table A5: Marginal effects from logistic regressions modelling the probability of leavers being back in New Zealand in years four and five after leaving (yrs4+5)

Characteristic	A. No controls			B. Some controls			C. Full model		
	ME	Sig	SE	ME	Sig	SE	ME	Sig	SE
Level of study (reference = level 1–3 certificates)									
Level 4 certificates	0.6		3.0	0.0		3.1	0.7		2.9
Level 5–7 diplomas	9.5	***	2.8	8.6	***	2.8	8.3	***	2.7
Level 7 bachelors/grad	1.6		2.0	-0.1		2.0	3.0		2.3
Level 8 honours/postgrad	-0.2		2.6	-1.8		2.6	-0.9		2.8
Level 9 masters	-4.4		3.1	-5.5	*	3.2	-1.3		3.6
Level 10 doctorates	-5.8		4.5	-8.1	*	4.4	-6.9		4.4
Sex (reference = males)									
Females				6.4	***	1.4	6.1	***	1.3
Port of disembarkation (reference = not Australia)									
Australia				-7.3	***	1.4	-8.4	***	1.4
Leaving age group (reference = 20–24 years)									
Under 20 years							5.3		4.1
25–29 years							4.3	**	1.9
30–34 years							1.0		3.5
35–39 years							1.2		4.1
40–49 years							0.6		4.0
50 years and over							2.5		4.7
Young completer? (reference = no)									
Yes							2.4		2.6
Ethnic group (reference = European)									
Māori							-8.9	***	2.9
Pacific peoples							-4.4		4.1
Asian							-23.1	***	1.5
Other ethnic groups							-18.1	***	2.8
European–Māori							-7.4	**	3.4
European–Other ethnic groups							-4.6		3.1
Leaving student loan amount (reference = \$0.00)									
\$0.01–\$10,000							-2.2		2.0
\$10,000–\$20,000							-2.7		2.1
\$20,000 and over							-5.0	***	1.8
No. of obs.	4,092			4,092			4,092		
No. of obs. back in NZ	1,047			1,047			1,047		
Adjusted R2	0.0049			0.0152			0.0554		
Model prediction correctly	74.4%			74.4%			74.6%		
Sensitivity (true positive)	0.0%			0.0%			2.0%		
Specificity (true negative)	100.0%			100.0			99.6%		

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: Marginal effects (ME) and standard errors (SE) have been multiplied by 100 to represent the percentage point estimate (and associated error) of the effect of switching from the omitted reference group. *** means statistically significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table A6: Marginal effects from logistic regressions modelling the probability of being abroad through 2008–2010

Characteristic	A. No controls			B. Some controls			C. Full model		
	ME	Sig	SE	ME	Sig	SE	ME	Sig	SE
Level of study (reference = level 1–3 certificates)									
Level 4 certificates	1.7	***	0.5	2.3	***	0.5	2.0	***	0.6
Level 5–7 diplomas	4.5	***	0.5	2.8	***	0.5	1.9	***	0.6
Level 7 bachelors/grad	14.5	***	0.5	9.7	***	0.5	7.0	***	0.5
Level 8 honours/postgrad	17.7	***	0.8	13.7	***	0.8	11.3	***	0.8
Level 9 masters	13.9	***	1.1	14.6	***	1.1	10.6	***	1.1
Level 10 doctorates	22.7	***	2.5	28.6	***	2.6	24.3	***	2.5
Sex (reference = males)									
Females				-2.8	***	0.4	-2.6	***	0.3
Age group (reference = 20–24 years)									
Under 20 years				-3.8	***	0.8	-3.4	***	0.8
25–29 years				-7.1	***	0.6	-4.6	***	0.8
30–34 years				-12.7	***	0.6	-8.8	***	0.9
35–39 years				-14.2	***	0.6	-10.5	***	0.9
40–49 years				-17.0	***	0.5	-13.3	***	0.8
50 years and over				-19.0	***	0.5	-15.5	***	0.8
Young completer? (reference = no)									
Yes							2.4	***	0.7
Ethnic group (reference = European)									
Māori							0.7		0.6
Pacific peoples							1.0		0.9
Asian							11.0	***	0.8
Other ethnic groups							10.7	***	1.3
European–Māori							-0.4		0.8
European–Other ethnic groups							3.2	***	0.9
Leaving student loan amount (reference = \$0.00)									
\$0.01–\$10,000							2.8	***	0.5
\$10,000–\$20,000							2.7	***	0.5
\$20,000 and over							4.6	***	0.5
No. of obs.	40,623			40,623			40,623		
No. of obs. still away	6,135			6,135			6,135		
Adjusted R2	0.0457			0.0977			0.1094		
Model prediction correctly	84.9%			84.9%			84.8%		
Sensitivity (true positive)	0.0%			0.0%			2.0%		
Specificity (true negative)	100.0%			100.0%			99.5%		

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: Marginal effects (ME) and standard errors (SE) have been multiplied by 100 to represent the percentage point estimate (and associated error) of the effect of switching from the omitted reference group. *** means statistically significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table A7: Marginal effects from logistic regressions, by broad field of study for level 1–3 certificates

Characteristic	A. Left 2004–10			B. Return yrs4+5			C. Abroad 08–10		
	ME	Sig	SE	ME	Sig	SE	ME	Sig	SE
Broad field of study (reference = 07 Education)									
01 Natural and Physical Sciences	1.3		5.4	...		...	4.2		4.7
02 Information Technology	-5.7	**	2.6	-19.7		13.7	-1.8		2.1
03 Engineering & Related Techs	-6.1	***	2.3	-19.9	*	11.3	-3.0		1.9
04 Architecture and Building	-6.5	**	3.0	...		...	-2.3		2.4
05 Agriculture, Env. & Related	-6.1	***	2.4	-13.6		12.7	-4.3	**	1.9
06 Health	-11.0	***	2.1	-22.9	**	10.6	-5.5	***	1.7
08 Management and Commerce	-3.1		2.2	-19.2	*	10.0	-1.0		1.8
09 Society and Culture	-2.2		2.3	-17.3	*	10.2	-1.2		1.8
10 Creative Arts	-2.3		2.8	-36.9	***	11.4	1.5		2.3
11 Food, Hospitality & Personal	-2.0		2.3	-22.6	**	10.5	0.0		1.9
12 Mixed Field Programmes	-6.2	***	2.2	-34.0	***	10.2	-1.9		1.8
Sex (reference = males)									
Females	-3.4	***	0.7	2.4		3.7	-2.0	***	0.5
Port of disembarkation (reference = not Australia)									
Australia				-13.0	***	4.3			
Age group for A and C; Leaving age group for B (reference = 20–24 years)									
Under 20 years	-0.1		1.5	4.1		4.8	-0.5		1.2
25–29 years	-6.4	***	1.4	16.0	*	8.3	-3.8	***	1.1
30–34 years	-10.1	***	1.4	-1.3		7.9	-5.2	***	1.1
35–39 years	-11.1	***	1.4	16.3		10.6	-5.5	***	1.1
40–49 years	-13.8	***	1.2	7.9		9.5	-7.1	***	1.0
50 years and over	-15.4	***	1.2	6.8		9.9	-8.5	***	0.9
Young completer? (reference = no)									
Yes	1.9		1.2	14.7	*	8.1	0.2		0.9
Ethnic group (reference = European)									
Māori	-0.2		0.8	-6.9		5.0	1.6	**	0.6
Pacific peoples	-0.3		1.3	0.7		8.3	0.3		1.0
Asian	6.7	***	2.1	-12.9	**	6.3	6.8	***	1.8
Other ethnic groups	8.9	***	3.4	...		...	9.0	***	2.9
European–Māori	0.1		1.2	-13.0	**	6.4	0.6		1.0
European–Other ethnic groups	-1.8		5.7	...		...	4.0		5.4
Leaving student loan amount (reference = \$0.00)									
\$0.01–\$10,000	2.6	***	0.8	-6.5		4.2	2.1	***	0.6
\$10,000–\$20,000	3.8	***	1.1	5.1		5.6	2.7	***	0.9
\$20,000 and over	6.7	***	1.6	-6.1		6.5	5.2	***	1.4
No. of obs.	14,010			645			14,010		
No. of obs. meeting condition	1,995			156			1,143		
Adjusted R2	0.0951			0.0881			0.0678		
Model prediction correctly	85.7%			76.2%			91.8%		
Sensitivity (true positive)	0.0%			13.5%			0.0%		
Specificity (true negative)	100.0			97.2%			100.0%		

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: Marginal effects (ME) and standard errors (SE) have been multiplied by 100 to represent the percentage point estimate (and associated error) of the effect of switching from the omitted reference group. *** means statistically significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level. '...' indicates that this cell was not estimable due to its small size or was suppressed for quality or confidentiality reasons.

Table A8: Marginal effects from logistic regressions, by broad field of study for level 4–7 certificates and diplomas

Characteristic	A. Left 2004–10			B. Return yrs4+5			C. Abroad 08–10		
	ME	Sig	SE	ME	Sig	SE	ME	Sig	SE
Broad field of study (reference = 07 Education)									
01 Natural and Physical Sciences	-1.2		4.3	2.1		16.8	0.5		3.3
02 Information Technology	-3.2		2.0	-15.4 *		8.0	1.8		1.5
03 Engineering & Related Techs	-0.1		2.4	-8.6		9.4	4.6 **		2.0
04 Architecture and Building	-0.5		2.2	-12.6		9.8	1.5		1.7
05 Agriculture, Env. & Related	-1.6		2.8	23.8 **		11.8	0.1		2.1
06 Health	-1.6		2.1	0.1		11.1	0.4		1.6
08 Management and Commerce	1.7		1.7	-8.9		6.9	3.3 **		1.3
09 Society and Culture	1.4		1.7	-3.0		6.8	3.5 ***		1.3
10 Creative Arts	0.8		1.8	2.3		7.4	2.5 *		1.4
11 Food, Hospitality & Personal	0.3		2.0	-5.9		8.1	2.7 *		1.5
Sex (reference = males)									
Females	-4.8 ***		0.9	1.7		3.5	-2.5 ***		0.7
Port of disembarkation (reference = not Australia)									
Australia				-14.2 ***		3.7			
Age group for A and C; Leaving age group for B (reference = 20–24 years)									
Under 20 years	-2.0		1.6	-1.0		6.2	-0.3		1.2
25–29 years	-6.2 ***		2.2	13.2		8.1	0.4		1.8
30–34 years	-15.3 ***		2.0	-4.9		9.1	-5.7 ***		1.6
35–39 years	-18.6 ***		2.0	-5.2		9.9	-7.1 ***		1.6
40–49 years	-20.7 ***		1.8	1.8		10.6	-9.4 ***		1.4
50 years and over	-23.6 ***		1.8	14.2		12.3	-11.2 ***		1.4
Young completer? (reference = no)									
Yes	1.5		1.6	11.6		7.5	0.3		1.3
Ethnic group (reference = European)									
Māori	-2.7 **		1.1	-12.1 **		5.2	0.1		0.9
Pacific peoples	-1.8		1.6	-13.9 **		6.6	1.0		1.3
Asian	6.0 ***		2.3	-24.2 ***		4.7	7.5 ***		1.9
Other ethnic groups	8.7 ***		3.2	-15.1 *		8.1	11.3 ***		3.0
European–Māori	-2.0		1.7	-0.6		7.1	-0.4		1.3
European–Other ethnic groups	-7.3 **		2.9	1.0		21.8	-3.3		2.3
Leaving student loan amount (reference = \$0.00)									
\$0.01–\$10,000	2.1 **		1.0	1.7		4.4	1.3		0.8
\$10,000–\$20,000	4.5 ***		1.2	-3.7		4.8	2.8 ***		1.0
\$20,000 and over	7.6 ***		1.5	-4.3		4.8	5.1 ***		1.2
No. of obs.	10,071			738			10,071		
No. of obs. meeting condition	2,032			222			1,125		
Adjusted R2	0.0867			0.0886			0.0574		
Model prediction correctly	79.7%			71.4%			88.8%		
Sensitivity (true positive)	0.4%			22.1%			0.0%		
Specificity (true negative)	99.8%			92.9%			100.0%		

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: Marginal effects (ME) and standard errors (SE) have been multiplied by 100 to represent the percentage point estimate (and associated error) of the effect of switching from the omitted reference group. *** means statistically significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level. '.' indicates that this cell was not estimable due to its small size or was suppressed for quality or confidentiality reasons.

Table A9: Marginal effects from logistic regressions, by broad field of study for bachelors degrees and graduate certificates or diplomas

Characteristic	A. Left 2004–10		B. Return yrs4+5		C. Abroad 08–10	
	ME	Sig	SE	ME	Sig	SE
Broad field of study (reference = 07 Education)						
01 Natural and Physical Sciences	9.1 ***		2.1	-12.2 **		5.3
02 Information Technology	7.7 ***		2.0	-16.2 ***		5.4
03 Engineering & Related Techs	8.9 ***		3.1	5.6		9.0
04 Architecture and Building	16.9 ***		2.9	-12.7 **		6.4
05 Agriculture, Env. & Related	4.1		5.3	-0.7		16.4
06 Health	10.7 ***		1.5	-11.1 ***		4.3
08 Management and Commerce	14.7 ***		1.4	-10.3 **		4.3
09 Society and Culture	12.0 ***		1.4	-11.2 ***		4.1
10 Creative Arts	9.4 ***		1.6	-13.0 ***		4.7
Sex (reference = males)						
Females	-3.3 ***		0.9	5.1 **		2.1
Port of disembarkation (reference = not Australia)						
Australia				-5.9 ***		2.1
Age group for A and C; Leaving age group for B (reference = 20–24 years)						
Under 20 years	-12.5 ***		4.8	...		...
25–29 years	-6.0 ***		2.2	1.1		2.7
30–34 years	-11.1 ***		3.2	8.8		7.4
35–39 years	-21.1 ***		3.1	-3.1		8.2
40–49 years	-26.6 ***		2.7	11.2		8.8
50 years and over	-30.2 ***		3.0	-0.8		9.4
Young completer? (reference = no)						
Yes	13.1 ***		2.5	6.4		4.5
Ethnic group (reference = European)						
Māori	-8.6 ***		2.3	-6.8		6.3
Pacific peoples	-1.7		2.7	1.2		7.2
Asian	7.2 ***		1.5	-22.9 ***		2.2
Other ethnic groups	7.7 ***		2.5	-21.9 ***		3.4
European–Māori	-4.9 **		2.0	-7.1		5.1
European–Other ethnic groups	5.6 ***		1.8	-1.9		3.9
Leaving student loan amount (reference = \$0.00)						
\$0.01–\$10,000	1.4		1.4	-2.7		3.6
\$10,000–\$20,000	2.3 *		1.3	-3.6		3.0
\$20,000 and over	5.3 ***		1.1	-5.6 **		2.7
No. of obs.	11,673			1,941		
No. of obs. meeting condition	4,578			501		
Adjusted R2	0.1221			0.0668		
Model prediction correctly	66.6%			74.2%		
Sensitivity (true positive)	58.7%			4.8%		
Specificity (true negative)	71.7%			98.3%		

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: Marginal effects (ME) and standard errors (SE) have been multiplied by 100 to represent the percentage point estimate (and associated error) of the effect of switching from the omitted reference group. *** means statistically significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level. '...' indicates that this cell was not estimable due to its small size or was suppressed for quality or confidentiality reasons.

Table A10: Marginal effects from logistic regressions, by broad field of study for postgraduate degrees

Characteristic	A. Left 2004–10			B. Return yrs4+5			C. Abroad 08–10		
	ME	Sig	SE	ME	Sig	SE	ME	Sig	SE
Broad field of study (reference = 07 Education)									
01 Natural and Physical Sciences	10.0	**	4.2	0.9		8.5	7.5	*	3.9
02 Information Technology	3.9		5.2	-11.7		10.6	4.6		4.7
03 Engineering & Related Techs	4.4		4.1	-2.1		8.8	2.5		3.8
04 Architecture and Building	6.6		6.3	2.7		14.4	10.5	*	6.2
05 Agriculture, Env. & Related	-4.3		6.4	9.1		18.2	-12.1	**	5.1
06 Health	0.5		3.8	4.8		9.0	-2.8		3.7
08 Management and Commerce	2.2		3.9	9.9		9.1	2.3		3.7
09 Society and Culture	4.7		3.7	3.7		8.2	3.3		3.5
10 Creative Arts	-1.3		4.6	-15.8	*	8.7	-0.9		4.4
Sex (reference = males)									
Females	-6.3	***	1.3	12.0	***	2.9	-5.0	***	1.3
Port of disembarkation (reference = not Australia)									
Australia				-4.8		2.9			
Age group for A and C; Leaving age group for B (reference = 20–24 years)									
25–29 years	-12.1	***	2.5	7.3	**	3.6	-6.7	***	2.1
30–34 years	-20.9	***	4.3	1.2		7.4	-9.6	**	3.9
35–39 years	-22.2	***	4.4	8.4		9.5	-8.8	**	4.1
40–49 years	-30.4	***	4.0	-11.5	**	5.7	-14.1	***	3.6
50 years and over	-34.2	***	4.2	2.1		10.0	-19.3	***	3.6
Young completer? (reference = no)									
Yes	12.3	***	3.4	-6.1		7.0	10.3	***	3.1
Ethnic group (reference = European)									
Māori	-4.7		4.6	22.1	**	11.1	-9.3	**	3.7
Pacific peoples	-3.4		5.5	-4.3		14.9	-1.1		4.9
Asian	5.9	***	2.1	-19.8	***	3.1	9.3	***	2.0
Other ethnic groups	7.0	*	3.6	-4.1		7.2	10.9	***	3.6
European–Māori	-11.7	***	3.5	-21.1	***	5.8	-6.8	**	3.0
European–Other ethnic groups	2.8		2.4	-8.3		5.2	2.3		2.3
Leaving student loan amount (reference = \$0.00)									
\$0.01–\$10,000	3.6	*	2.1	1.5		4.5	3.4	*	1.9
\$10,000–\$20,000	3.1		2.1	-2.2		5.0	2.6		1.9
\$20,000 and over	4.5	***	1.7	-3.3		3.5	4.7	***	1.5
No. of obs.	4,869			771			4,869		
No. of obs. meeting condition	1,914			168			1,221		
Adjusted R2	0.1505			0.1199			0.1037		
Model prediction correctly	70.4%			78.3%			74.7%		
Sensitivity (true positive)	65.9%			8.8%			6.2%		
Specificity (true negative)	73.3%			98.0%			97.6%		

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: Marginal effects (ME) and standard errors (SE) have been multiplied by 100 to represent the percentage point estimate (and associated error) of the effect of switching from the omitted reference group. *** means statistically significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level. '...' indicates that this cell was not estimable due to its small size or was suppressed for quality or confidentiality reasons.

Table A11: Proportion abroad 2008–2010, by narrow field of study for level 1–3 certificates and level 4–7 certificated and diplomas

Narrow field of study	Level 1–3				Level 4–7			
	Count	% Abroad 2008–10	Standard Error	% Abroad 2008–10 (adjusted)	Count	% Abroad 2008–10	Standard Error	% Abroad 2008–10 (adjusted)
0109 Biological Sciences	24	S	S	S	57	8.8	3.7	8.7
0199 Other Sciences^	42	S	S	S	27	S	S	S
0201 Computer Science	183	7.1	1.9	9.0	489	12.9	1.5	10.0
0203 Information Systems	108	11.1	3.0	9.6	210	17.1	2.6	13.2
0299 Other Information Technology	126	10.3	2.7	7.3	90	14.4	3.7	10.6
0307 Mechanical & Industrial Eng.	150	10.7	2.5	7.1	42	S	S	S
0313 Electrical & Electronic Eng.	195	8.7	2.0	5.7	75	20.0	4.7	15.9
0315 Aerospace Engineering	39	S	S	S	45	S	S	S
0399 Other Engineering^	732	9.8	1.1	7.3	186	17.7	2.8	14.9
0401 Architecture & Urban Env.	0	S	S	S	129	10.9	2.7	10.6
0403 Building	174	11.5	2.4	7.9	396	12.4	1.6	10.5
0501 Agriculture	159	4.4	1.6	4.3	30	S	S	S
0503 Horticulture & Viticulture	159	6.3	1.9	6.4	120	9.2	2.6	10.2
0599 Other Agriculture & Env.^	309	9.1	1.6	6.3	93	10.8	3.2	9.7
0603 Nursing	45	S	S	S	99	7.1	2.6	10.3
0611 Veterinary Studies	36	S	S	S	117	6.0	2.2	5.8
0613 Public Health	2,973	2.7	0.3	4.0	48	S	S	S
0617 Rehabilitation Therapies	30	S	S	S	141	9.2	2.4	11.2
0699 Other Health^	198	9.1	2.1	9.9	231	8.7	1.9	8.9
0701 Teacher Education	438	6.2	1.1	10.8	696	6.8	1.0	8.3
0703 Curriculum & Education Studies	39	S	S	S	69	13.0	4.1	15.8
0799 Other Education	66	4.5	2.6	7.2	138	1.4	1.0	2.6
0801 Accountancy	15	S	S	S	180	11.1	2.3	11.8
0803 Business & Management	804	9.1	1.0	9.8	933	11.4	1.0	11.8
0805 Sales & Marketing	426	9.2	1.4	11.8	102	12.7	3.3	11.7
0807 Tourism	303	13.9	2.0	9.6	282	20.9	2.4	15.6
0809 Office Administration	1,233	7.7	0.8	8.2	267	8.6	1.7	7.9
0899 Other Mgmt. & Commerce^	21	S	S	S	66	9.1	3.4	7.8
0903 Studies in Human Society	24	S	S	S	36	S	S	S
0905 Human Welfare	447	7.4	1.2	8.2	534	4.7	0.9	7.1
0915 Language & Literature	147	9.5	2.4	8.8	1,491	7.0	0.7	11.2
0917 Philosophy & Religious Studies	45	S	S	S	117	9.4	2.7	10.6
0921 Sport & Recreation	594	14.3	1.4	9.9	342	24.3	2.3	18.6
0999 Other Society & Culture^	159	8.2	2.2	7.0	207	8.2	1.9	8.8
1001 Performing Arts	51	5.9	3.2	3.4	153	16.3	3.0	12.4
1003 Visual Arts & Crafts	144	18.1	3.2	17.6	246	10.2	1.9	9.8
1005 Graphic & Design Studies	63	12.7	4.2	12.4	522	15.5	1.6	12.2
1007 Communication & Media	90	13.3	3.6	9.6	291	14.4	2.1	11.0
1101 Food & Hospitality	780	15.5	1.3	10.6	300	16.7	2.2	12.9
1103 Personal Services	447	13.0	1.6	9.7	408	12.0	1.6	10.4
1200 Mixed Field Programmes^	1,992	7.2	0.6	8.4	57	14.0	4.6	18.5
All – fields of study	14,010	8.2	0.2	8.2	10,071	11.2	0.3	11.2

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3. 'S' indicates that data has been suppressed for quality or confidentiality reasons. '^' indicates that this field aggregates together narrow fields of study that were too small to analyse separately.

Table A12: Proportion abroad 2008–2010 by narrow field of study for level 7 bachelors and graduate qualifications, and postgraduate qualifications

Narrow field of study	Bachelors/grad				Postgraduate			
	Count	% Abroad 2008–10	Standard Error	% Abroad 2008–10 (adjusted)	Count	% Abroad 2008–10	Standard Error	% Abroad 2008–10 (adjusted)
0101 Mathematical Sciences	126	36.5	4.3	29.4	54	37.0	6.7	28.1
0103 Physics & Astronomy	33	S	S	S	27	S	S	S
0105 Chemical Sciences	36	S	S	S	39	S	S	S
0107 Earth Sciences	72	30.6	5.4	26.7	90	41.1	5.2	33.6
0109 Biological Sciences	189	23.8	3.1	20.9	177	32.8	3.5	30.0
0199 Other Sciences	129	21.7	3.6	21.5	57	19.3	5.4	16.0
0201 Computer Science	246	35.8	3.1	28.5	66	42.4	6.0	26.6
0203 Information Systems	504	23.6	1.9	20.2	96	28.1	4.6	26.8
0299 Other Information Technology	30	S	S	S	3	S	S	S
0307 Mechanical & Industrial Eng.	24	S	S	S	105	39.0	4.8	27.1
0309 Civil Engineering	15	S	S	S	117	38.5	4.6	27.3
0313 Electrical & Electronic Eng.	75	21.3	4.7	14.8	168	40.5	3.8	24.1
0399 Other Engineering^	114	28.1	4.2	24.9	186	33.3	3.5	23.9
04 Architecture & building^	264	33.7	2.9	28.1	63	36.5	6.1	32.9
0509 Environmental Studies	27	S	S	S	33	S	S	S
0599 Other Agriculture & Env. ^	54	11.1	4.4	11.8	27	S	S	S
0601 Medical Studies	204	25.5	3.0	17.0	180	15.6	2.7	25.0
0603 Nursing	1,002	16.8	1.2	23.3	219	6.8	1.7	15.8
0605 Pharmacy	132	40.9	4.3	28.4	18	S	S	S
0607 Dental Studies	57	40.4	6.5	28.1	21	S	S	S
0613 Public Health	36	S	S	S	75	13.3	3.9	21.4
0617 Rehabilitation Therapies	249	28.5	2.9	26.4	54	9.3	3.9	11.5
0699 Other Health^	228	28.9	3.0	27.2	153	18.3	3.1	21.1
0701 Teacher Education	2,208	10.9	0.7	14.7	90	16.7	3.9	23.8
0703 Curriculum & Education Studies	321	10.6	1.7	17.1	147	10.9	2.6	23.9
0801 Accountancy	351	27.4	2.4	25.0	81	25.9	4.9	21.8
0803 Business & Management	753	25.6	1.6	23.3	459	19.2	1.8	26.6
0805 Sales & Marketing	642	33.0	1.9	27.7	120	21.7	3.8	21.4
0811 Banking & Finance	204	22.5	2.9	23.4	105	26.7	4.3	28.1
0899 Other Mgmt. & Commerce^	132	34.1	4.2	30.8	12	S	S	S
0901 Political Science & Policy	90	22.2	4.3	19.6	99	19.2	3.9	18.6
0903 Studies in Human Society	369	23.6	2.2	24.2	177	23.2	3.2	24.0
0905 Human Welfare	186	10.2	2.2	17.4	30	S	S	S
0907 Behavioural Science	276	27.2	2.7	26.4	180	26.7	3.3	26.9
0909 Law	198	26.3	3.1	23.7	732	32.5	1.7	27.8
0915 Language & Literature	402	26.9	2.2	25.7	126	23.8	3.8	28.7
0917 Philosophy & Religious Studies	120	19.2	3.6	22.3	42	S	S	S
0919 Economics & Econometrics	180	40.6	3.7	33.2	117	21.4	3.8	21.2
0921 Sport & Recreation	96	24.0	4.4	23.2	27	S	S	S
0999 Other Society & Culture^	141	29.8	3.9	27.4	96	17.7	4.0	21.4
1001 Performing Arts	159	22.6	3.3	21.1	45	S	S	S
1003 Visual Arts & Crafts	291	23.4	2.5	21.8	48	S	S	S
1005 Graphic & Design Studies	372	30.9	2.4	26.2	21	S	S	S
1007 Communication & Media	333	20.1	2.2	19.6	57	22.8	5.6	25.1
All – fields of study	11,673	22.7	0.4	22.7	4,869	25.1	0.6	25.1

Source: Figures have been extracted from the IDI prototype managed by Statistics NZ.

Note: All counts behind this table have been randomly rounded to base 3. 'S' indicates that data has been suppressed for quality or confidentiality reasons. '^' indicates that this field aggregates together narrow fields of study that were too small to analyse separately.

