MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Immigration and Labour Market Outcomes of International Tertiary Students

March 2018

New Zealand Government

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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Summary of findings

Introduction

In 2015/16, international education was New Zealand's fourth largest export earner, contributing $4.28 billion to gross domestic product. International education has grown significantly in recent years, and New Zealand has immigration policies that support international students to transition from study to work and permanent residence.

This report aims to improve our understanding of the common visa pathways after study and the labour market outcomes of former students.

International fee-paying tertiary students who left study in 2006 to 2011 were tracked for five years. In this report, we are not looking at whether the students graduated; rather, we consider students to have left study if:

- their student visa ended
- they transitioned from their student visa to a New Zealand work or residence visa
- they left New Zealand and did not return within six months of their departure date.[1]

We also look at outcomes for the more recent 2012–13 cohort (for whom we do not yet have five-year data) to get some indication of the likely future changes in five-year outcomes.

International student population changed markedly 2006 to 2015

The number of international tertiary students who left study increased by 22% from 2006–07 to 2014–15, with 35,013 students leaving study in the two-year period 2006–07 and 42,756 students in 2014–15.

The number of Indian students increased markedly and the number of Chinese students decreased during this period.

The increase in students leaving study was mostly students leaving private training establishments, while the number of students who left study from universities decreased.

The number of students who studied sub-degree and post-degree certificates and diplomas increased, and the number of students who studied to bachelor's degree level decreased.

The most popular field of study was management and commerce, which was studied by around a third of students, followed by society and culture[2], which was studied by around a fifth of students.

Most students leave New Zealand after study

For all cohorts included in the study, by five years after study, around two-thirds of former students had left New Zealand. Of those who stayed, most transitioned to residence visas and a small (but increasing) proportion were on work visas.

[1] Six months is commonly used to decide long-term absence, as it is deemed long enough that the migrant is unlikely to be out of the country only temporarily.

[2] Most international students studying in the society and culture field were studying language and literature or economics and econometrics.

Just over half of the former students who stayed in New Zealand had transitioned to residence as a principal in the Skilled Migrant Category (SMC) five years after leaving study (55% of those who stayed), while a third (31%) gained residence through a Partnership visa or as a secondary SMC. One in 10 former students was still on a work visa.

Indian former students were more likely than former students of other nationalities to stay in New Zealand.

Students who studied sub-degree and post-degree level certificates and diplomas were more likely to stay in New Zealand than students who studied at other levels. This could relate to work and residence visa opportunities. From 2008 to 2010, qualifications at or above level 4 on the New Zealand Qualifications Framework gave students five bonus points towards an SMC residence visa. From 2011, bachelor degrees or qualifications at level 8 gave students 10 bonus points.

Students who studied information technology or food hospitality and personal services were more likely to stay in New Zealand than students who studied other fields.

Among the former students who obtained New Zealand residence, most initially gained a work visa and transitioned onto a residence visa in their second to fourth year after leaving study.

Labour market outcomes for former students who stayed in New Zealand

Most (70% or more) of the former students who stayed in New Zealand were employed one, three and five years after leaving study. For each cohort, the proportion employed decreased slightly over time, with a smaller proportion employed five years after study than at one year. More than half of the employed former students (around 60%) were in the Auckland region.

Employment rates were the highest among former students who had transitioned to job-dependent work visas[3] or as a principal SMC. The median earnings among SMC principal applicants were higher than the median earnings of former students who were on job-dependent work visas.

Higher earnings and employment rates were also seen among former students who had studied at higher levels and among those who had studied engineering and science, information technology or “other fields”. Lower employment rates were seen among Chinese and South Korean former students, and these students were also less likely to be principal SMC applicants and more likely to be on Partnership visas or to be secondary SMCs.

Among the former students who stayed and worked in New Zealand, earnings increased during the first five years after study, with an overall 23% increase between one and three years post-study and a further 14% increase between years three and five. Earnings progression appeared to be higher for former students who had studied at higher levels.

Differences in median earnings by region were not large, but industry of employment did appear to be related to differences in median earnings. Former students employed in professional, scientific and technical services and the health care and social assistance industries tended to have higher earnings, while former students employed in the

[3] Job-dependent work visas include principal applicants on a Long Term Business visa, an Entrepreneur work visa, a Study to work visa, an Essential Skills visa, a Recognised Seasonal Employer visa and a Work to residence visa.

accommodation and food services, administrative and support services, and retail trade industries tended to have lower earnings.

Looking forward: visa and labour market outcomes three years post-study

More recent cohorts of former students have not yet been in New Zealand long enough for us to track their five-year outcomes. However, for the 2012–13 cohort we can look at their three-year outcomes to get an indication of their likely future five-year outcomes.

While fewer former students left study in 2012–13 than in 2010–11, a higher proportion and an overall larger number of them remained in New Zealand three years later (16,293 of the 2012–13 cohort were in New Zealand compared with 15,069 of the 2010–11 cohort). There will be some further emigration of the 2012–13 former students from New Zealand, but emigration between years three and five has trended down over time. Based on these findings we infer that a larger number of the 2012–13 cohort will remain in New Zealand five years after study than remained at that point for the 2010–11 cohort.

Three-year outcomes for the 2012–13 cohort (with respect to visa status, employment and earnings) were very similar to the three-year outcomes of the 2010–11 cohort. This suggests that the major change in five-year outcomes will relate to higher overall numbers of former students staying in New Zealand, rather than to changes in their distribution of outcomes. However, recent changes to SMC eligibility criteria and work visa settings may affect the 2012–13 students.

Introduction

In 2015–16, international education was New Zealand's fourth largest export earner, contributing $4.28 billion to gross domestic product of which 81% was from tertiary education (the remainder was from primary and secondary education).[4]

Since 2012–13, international education has grown significantly, with a 25% increase in the total number of students and a large increase in the capacity of the private training establishment (PTE) sector. In 2015–16, this sector took nearly 50% more students than in 2012/13.

Following recent policy changes (table A.2, Appendix 1), the strong growth in student numbers seen from 2012–13 onwards has tapered off, with growth of less than 1% between 2015–16 and 2016–17. This was driven by a decrease in the number of new students arriving, down 3% over the previous year. In particular, the number of new students from India was down 32%.

International students can play an important role in New Zealand's labour market, and students who stay in New Zealand after study may help to alleviate skills shortages. In recognition of this, New Zealand has policies that support international students to transition from study to work and permanent residence, with the goal of facilitating the entry of genuine foreign students and developing people with the skills that New Zealand needs (Appendix 1).

In this report, we track international full fee-paying tertiary students for five years after they leave study[5]. We look at whether they stay in New Zealand and, for those who stay, what types of visas they transition to and what their labour market outcomes are. We aim to better understand the contribution of international education to the labour market. This work addresses four key questions.

1. What proportion of international fee-paying students transition to work or residence in New Zealand?
2. What are the characteristics of students who transition, and are there particular visa pathways for certain groups of students?
3. What are the retention rates of students three years and five years after their last student visa?
4. What are former students' labour market outcomes after transitioning to work or residence, and do particular groups have more favourable outcomes than others?

Method

We used Statistics New Zealand's Integrated Data Infrastructure (IDI) to link Immigration New Zealand's administrative data on visa status and departures with tertiary student data from the Single Data Return (SDR) and with employment status and earnings data from the Inland Revenue tax dataset.

[4] Infometrics. (2016). *The Economic Impact of International Education in New Zealand 2015/16*. Wellington: Education New Zealand. Retrieved on 17 November 2016 from: www.enz.govt.nz/news-and-research/research/the-economic-impact-of-international-education-201516

[5] Only those on a Full fee-paying student visa are included as they have a pathway to residence. Other fee paying students like English language students are not included as there is no clear path to residence for these students.

International fee-paying tertiary students who left study in 2005 to 2012 were tracked for five years. In this report, we are not looking at whether the students graduated; rather, we consider students to have left study if:

- their student visa ended
- they transitioned from their student visa to a New Zealand work or residence visa
- they left New Zealand and did not return within six months of their departure date.[6]

We looked at two immigration and labour market outcomes:

- The visa status of fee-paying international tertiary students who had left study (one, three and five years after leaving).
- The labour force status, earnings, industries and regions of work of fee-paying international tertiary students who remained in New Zealand after leaving study (one, three and five years after leaving).

We examined the relationships between those immigration and labour market outcomes and the following factors.

- The last year in which a student held a study visa, grouped into two-year cohorts: 2006–07, 2008–09, 2010–11, 2012–13 and 2014–15.[7]
- Student nationality, focusing on the three largest source countries (China, India, and South Korea) and using the United States (USA) as a comparison country.
- The type of institution attended: universities, PTEs, and institutes of technology and polytechnics.
- The level of study: non-formal study and level 1–3 certificates; sub-degree certificates and diplomas; bachelor's degree; post-degree certificates, diplomas and honours; and master's degrees and doctorates.
- The field of study, focusing on the five most common fields for international students: engineering and science; food, hospitality, and personal services; information technology; management and commerce; and society and culture.

A cohort approach was taken in which we tracked the pathways of the former students in each two-year cohort. This allowed us to determine the route that the former students took through different visa types. For example, we can determine whether the former students who obtained permanent residence after five years were first awarded work visas or whether they went directly to residence one year after study.

Follow up

Given changes over the last few years in the makeup of the student population and recent changes to work and residence visa requirements, it is expected that we will re-run this analysis in a few years to see what effect those changes have made to transition rates and labour market outcomes.

[6] Six months is commonly used to decide long-term absence, as it is deemed long enough that the migrant is unlikely to be out of the country only temporarily.

[7] Years have been grouped into two-year cohorts to allow for more breakdowns by nationality, institute, level of study and field of study.

Limitations on data

Data on level of study or field of study does not include students from PTEs that are not in the SDR database (Appendix 2). We cannot determine what level or field the students attending non-SDR PTEs studied at. Export education levy data for 2005 to 2012 suggests that 79% of international students studying at PTEs were at a non-SDR PTE.[8] This is most likely to impact on the level of study results as PTEs are more likely to offer below bachelor's degrees and post-degree certificates, diplomas and honours level qualifications.

As well as the missing data for non-SDR PTEs, there is a mismatch issue at play, where not all students in the immigration data can be matched to those in the SDR or in the tax data.

The combined effect of the lack of information on the non-SDR students and the mismatch between datasets means that when all three datasets are joined to look at the employment outcomes for level of field or study of field, the dataset is much smaller than the overall number of students.

For instance, the 2010–11 cohort has 13,632 students who are still in New Zealand on a work or residence visa at five years. When the SDR data and the IRD data are matched with immigration data, the number of students in that combined dataset is 8,500 students (62%). Some of this lose may be due to former students not working and therefore not being in the tax dataset. The rest will be due to records not matching across datasets.

[8] 2015 Export Education Levy Full-Year Statistics. (2015). *Education Counts.* Retrieved on 28 October 2016 from: www.educationcounts.govt.nz/statistics/international-education/international-students-in-new-zealand

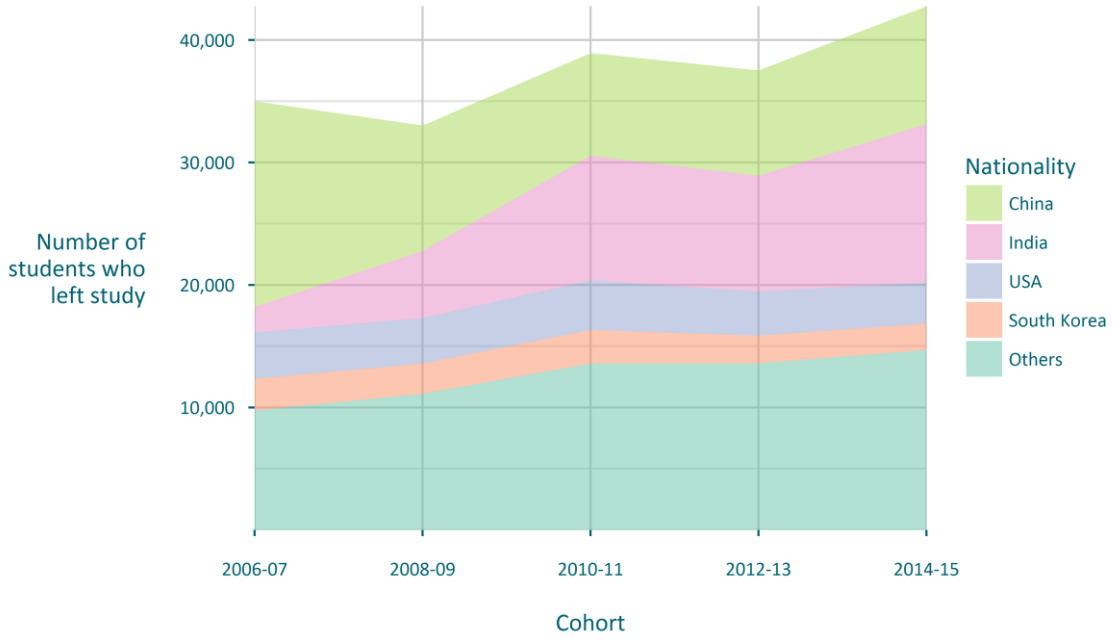
1. Changes in student and study characteristics

International tertiary student population from 2006–07 to 2014–15

The number of international tertiary students who left study increased by 22% from 2006 to 2015, with 35,013 former students in the 2006–07 cohort, and 42,756 former students in the 2014–15 cohort (Figure 1). This increase was driven primarily by former students of Indian and "Other" nationalities, while there was a decrease in the number of Chinese former students after 2006–07 (Figure 1).

A decrease in the overall number of former students in the 2008–09 cohort was driven by a decrease in Chinese former students leaving study, while a decrease in 2012–13 was driven by a decrease in Indian former students leaving. In 2014–15, the number of Chinese former students remained at this lower level, while the number of Indian former students rebounded.

Figure 1. International tertiary students who left study from 2006–07 to 2014–15, by nationality and cohort

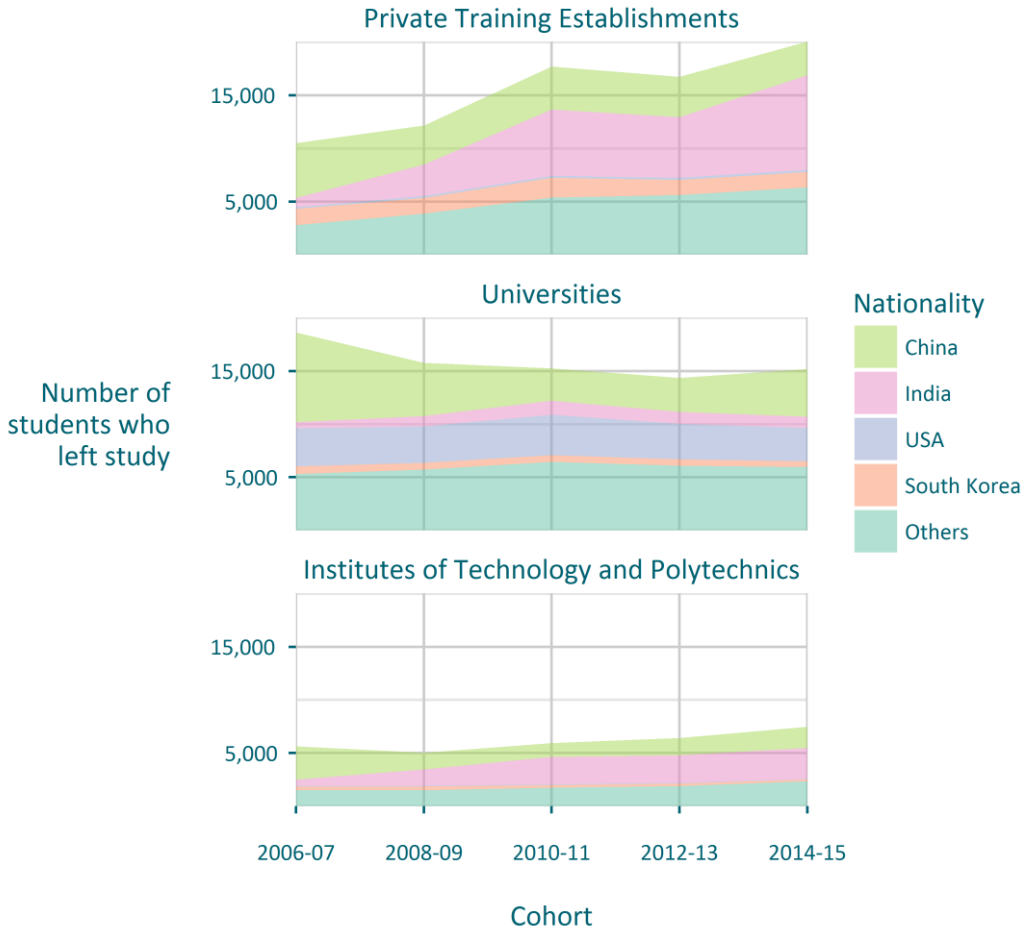


Source: Migration spells dataset (Ministry of Business, Innovation and Employment (MBIE)).

Private training establishments absorbed most of the increase in students

The increase in Indian and "Other" nationality former students was absorbed mostly by PTEs and, albeit to a lesser extent, by institutes of technology and polytechnics (Figure 2). The number of former students who left study at universities decreased after 2006–07, with a decrease in the number of former students from China (Figure 2).

Figure 2. International tertiary students who left study from 2006–07 to 2014–15, by nationality, cohort and type of institution they studied at



Source: Migration spells dataset (MBIE).

Note: Data is not shown for the small number of former students who attended other types of institutions or for whom data on the institution they attended was missing. These former students comprised less than 1% of the total number of former students.

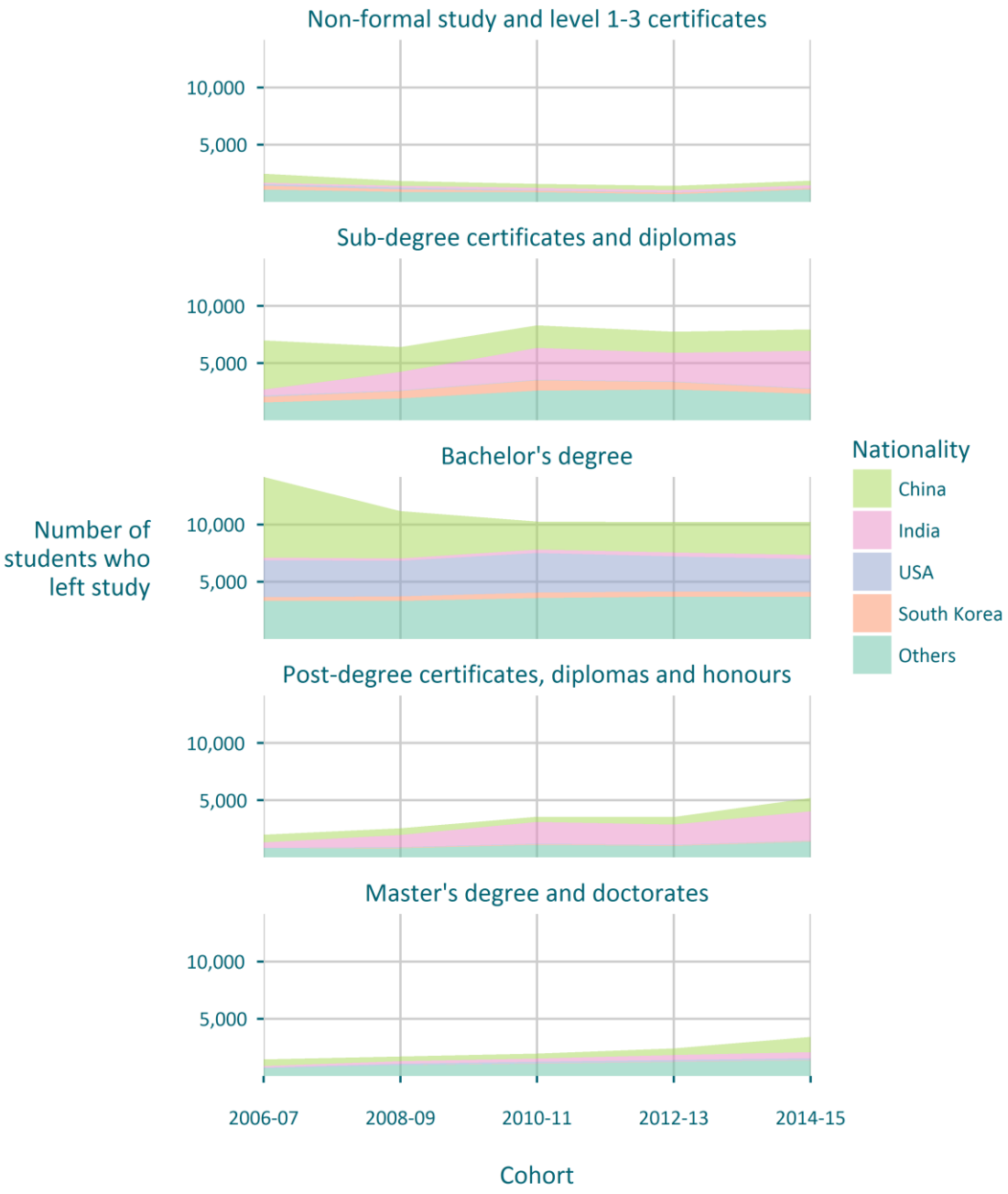
Number of former students who studied sub-degree and post-degree certificates and diplomas increased and at bachelor's level decreased

Among international tertiary students who left study, the number who studied sub-degree certificates and diplomas increased from 2006–07 to 2014–15, as did the numbers who studied at post-degree level (Figure 3). The number who studied at bachelor's level decreased, in association with the decrease in Chinese former students after the 2006–07 cohort (Figure 3).

A slight decrease is apparent in the number studying at the lowest level (non-formal and level 1–3 certificates), although numbers began to increase again in the 2014–15 cohort. In 2008, policy changed so New Zealand qualifications below level 4 no longer provided advantages for Study to work and Skilled Migrant Category (SMC) residence visa applicants (Appendix 1). If the ability to stay and work in New Zealand after studying encourages students to seek education

in New Zealand, this may explain the increase in former students at level 4 and the slight decrease at levels 1–3.

Figure 3. International tertiary students who left study from 2006–07 to 2014–15, by nationality, cohort and level of study

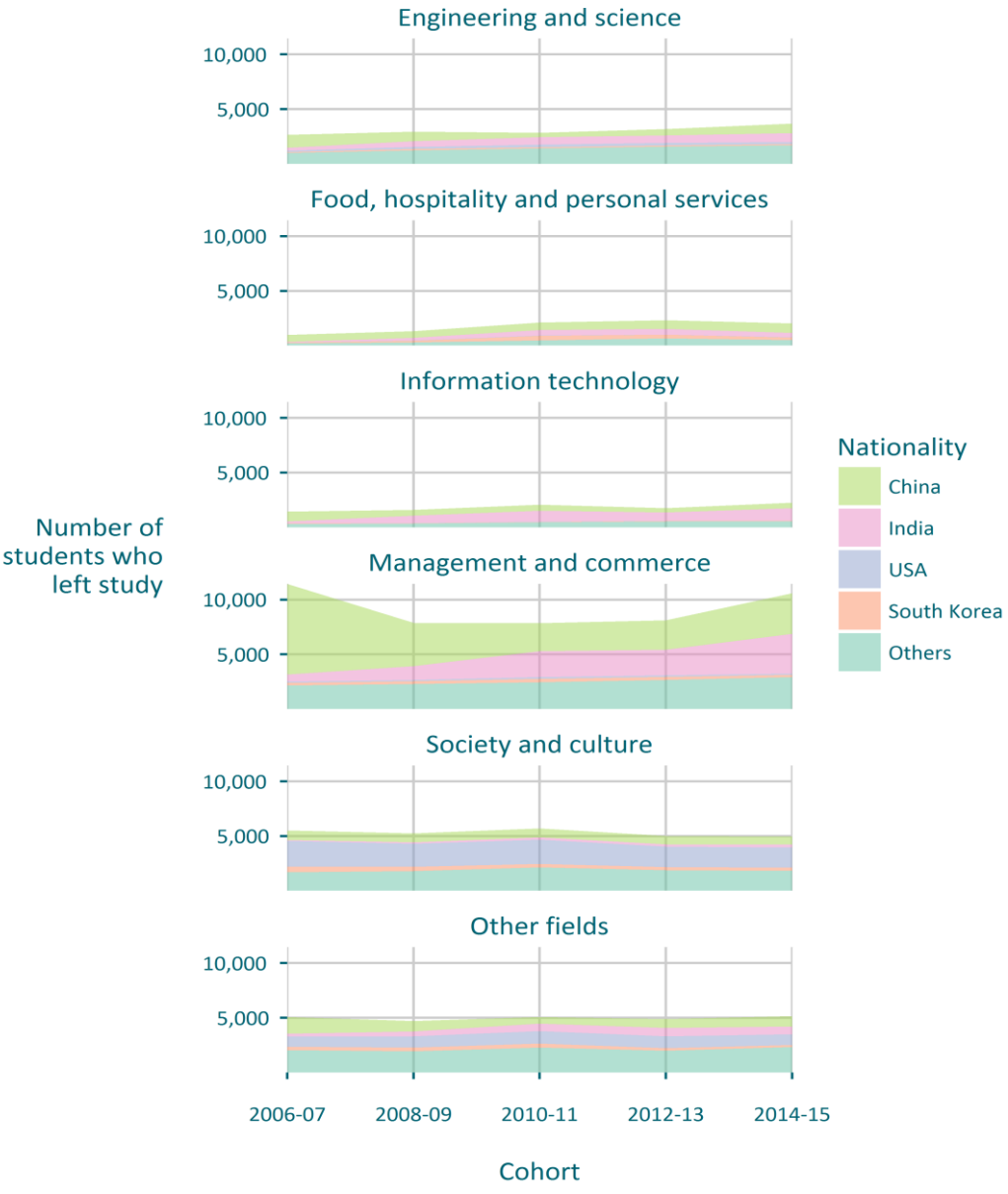


Source: Matched migration spells dataset and SDR data (IDI).

Management and commerce and society and culture are the most studied fields

Around a third of the former students studied management and commerce. The number and proportion in this field decreased after 2006–07, and then began to increase again in 2014–15 (Figure 4). Study of society and culture accounted for around 20% of former students. Engineering and sciences accounted for around 12% of former students, with a fairly steady increase from 2006 to 2015. The fields of information technology and food, hospitality and personal services both accounted for less than 10% of former students, but with increases over time (Figure 4).

Figure 4. International tertiary students who left study from 2006–07 to 2014–15, by nationality, cohort and field of study



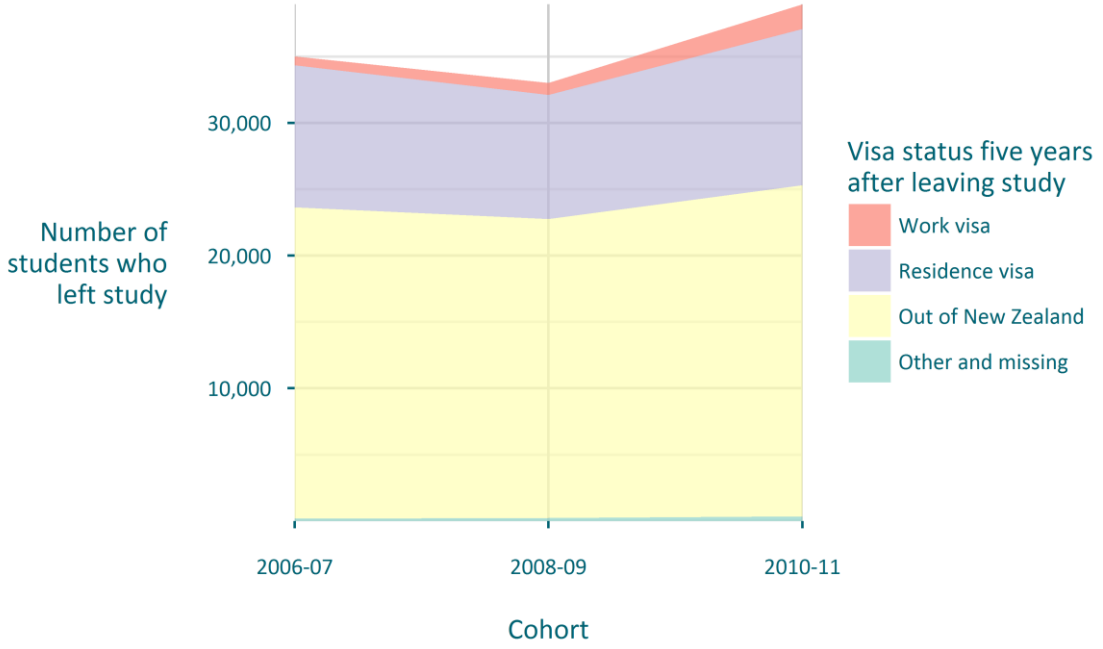
Source: Matched migration spells dataset and SDR data (IDI).

2. Visa pathways

Most students leave New Zealand after study

Five years after studying, around two-thirds of students were no longer in New Zealand (Figure 5). Of those who remained in New Zealand, by five years most had transitioned to a residence visa, while a few were on work visas (Figure 5). The overall number of former students increased from 2006–07 to 2010–11, while the proportion who left New Zealand decreased slightly from 67% to 64%. The proportion who transitioned to residence remained quite stable, while the proportion who moved onto work visas more than doubled, from 1.9% of the 2006–07 cohort (660 former students) to 4.8% of the 2010–11 cohort (1,857 former students).

Figure 5. Visa status, five years after leaving study, of international tertiary students who left study from 2006–07 to 2010–11, by cohort



Source: Migration spells dataset (MBIE).

Post-2011 cohorts are excluded because those migrants have not been in New Zealand for five years.

Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

Nationality and field of study are the strongest predictors of visa outcomes

Statistical modelling of the associations between visa outcomes and five factors (cohort, nationality, institution, field of study and level of study) showed that all five factors had statistically significant associations with visa outcomes and that there were interactions between them (Appendix 3). This means cohort, nationality, institution, field of study and level of study all make important contributions to predicting the likelihood that a former student will go on to leave New Zealand or to take up a work or residence visa.

Further analysis of the relative importance of the five factors indicated that nationality and field of study contributed the most to explaining the visa outcomes of former students (Appendix 3).

In the following sections we examine the associations between visa outcomes and the three factors of nationality, field of study and level of study. This is because nationality and field of study are the strongest predictors of visa outcomes and because level of study is highly relevant to changes that have been made to immigration policy during the period we are examining. Cohort is also included in each chart because of its association with overall changes in former student numbers.

Indian former students were the most likely to be in New Zealand five years after leaving study

Different nationalities have different visa outcomes. At five years after studying, almost all (97%) of the former students from the USA had left New Zealand, while two-fifths (41%) of the former students from India, around 58% of the former students from China, and 77% of the former students from South Korea had left (Figure 6).

Students from the USA are often exchange students who study in New Zealand at bachelor's level for one or two semesters and then return to the USA to complete their degrees. This means they have a distinctly different pattern of visa outcomes to former students from other countries.

The overall number of Indian former students increased over time. This was associated with a temporary increase in the proportion that left New Zealand after study (39% left in 2006–07, 46% in 2008–09 and 39% in 2010–11). Due to the overall increase in Indian former students over this period, the number who stayed in New Zealand increased strongly from 1,257 in 2006–07 to 6,165 in 2010–11. For those who stayed, the proportion on residence visas at year five decreased from 57% in 2006–07 to 49% in 2010–11 and the proportion on work visas increased from 4% in 2006–07 to 11% in 2010–11 (Figure 6).

The proportion of South Korean former students who left New Zealand after studying decreased from 84% in 2006–07 to 69% in 2010–11, and the proportion on residence and work visas increased (from 14% to 27% for residence visas and from 1% to 3% for work visas) (Figure 6).

For Chinese former students there was a slight increase in the proportion who left New Zealand (from 56% in 2006–07 to 61% in 2010–11) and a concurrent decrease in the proportion who transitioned to residence visas (Figure 6).

Figure 6. Visa status, five years after leaving study, of international tertiary students who left study from 2006–07 to 2010–11, by nationality and cohort

Source: Migration spells dataset (MBIE).

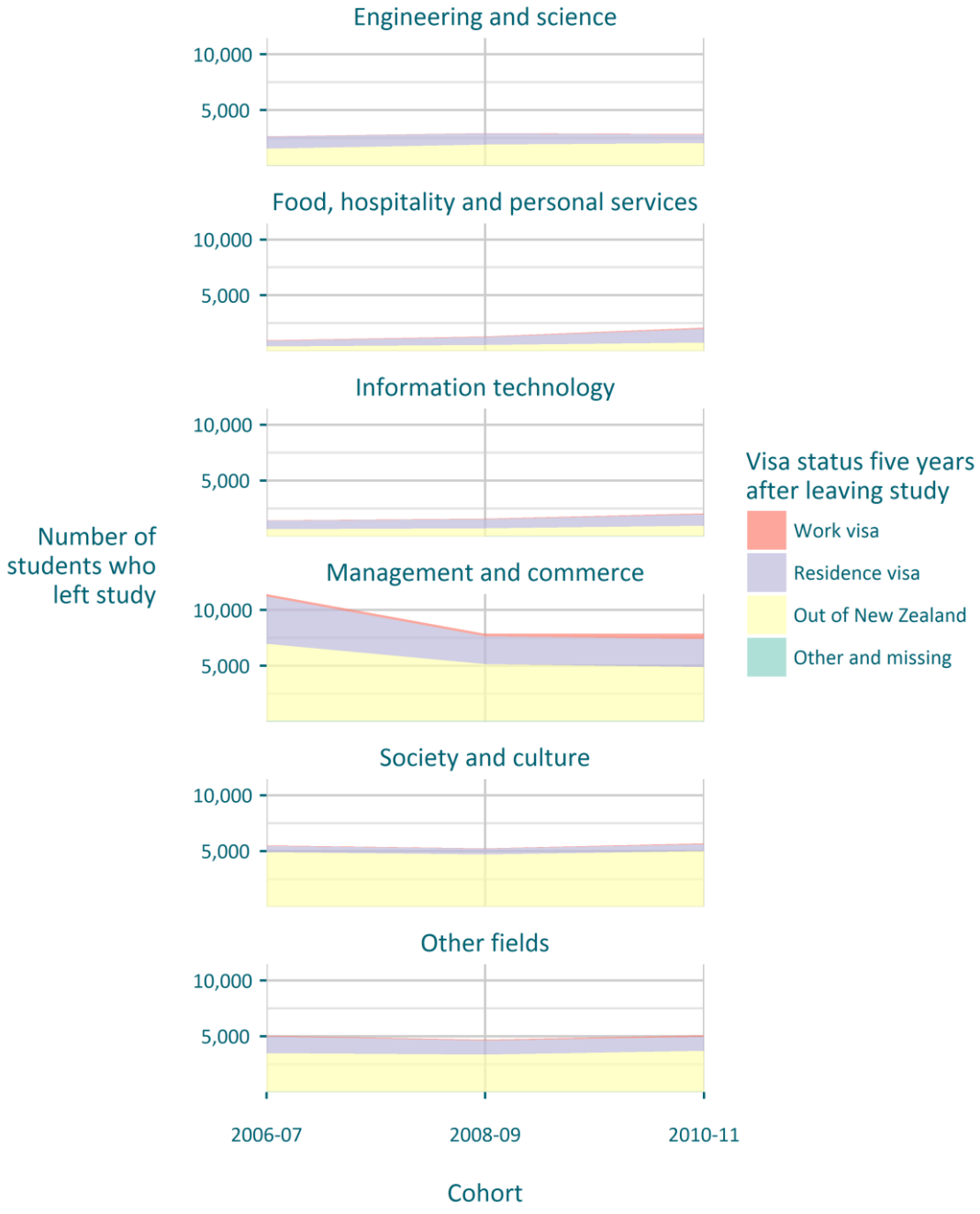
Note: Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

Food, hospitality and personal services and information technology former students the most likely to still be in New Zealand five years after leaving study

Former students who studied society and culture were less likely to stay in New Zealand than former students studying other fields, while former students studying information technology, or food hospitality and personal services were more likely to stay (Figure 7). Five years after leaving study, 87–89% of society and culture former students had left New Zealand compared with 61–65% of management and commerce former students, 57–71% of engineering and science former students, 44–45% of information technology former students, 36–45% of food, hospitality and personal services former students and 69–72% of former students in other fields.

Across cohorts, there were some changes in the likelihood of different visa outcomes. There was an increase in the proportion of engineering and science former students who left New Zealand (from 57% in 2006–07 to 71% in 2010–11), and a corresponding decrease in the proportion who transitioned onto residence visas. There was a slight decrease in the proportion of information technology former students who transitioned onto residence visas and a corresponding increase in the proportion on work visas (from 2% in 2006–07 to 4% in 2010–11). This was also the case for management and commerce former students whose transitions onto work visas increased from 2% in 2006–07 to 6% in 2010–11. The proportion of food, hospitality and personal services former students who left New Zealand decreased from 45% in 2006–07 to 36% in 2010–11, and the proportion on both residence and work visas increased (Figure 7).

Figure 7. Visa status, five years after leaving study, of international tertiary students who left study between 2006 and 2011, by field of study and cohort



Source: Matched migration spells and SDR data (IDI).

Note: Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

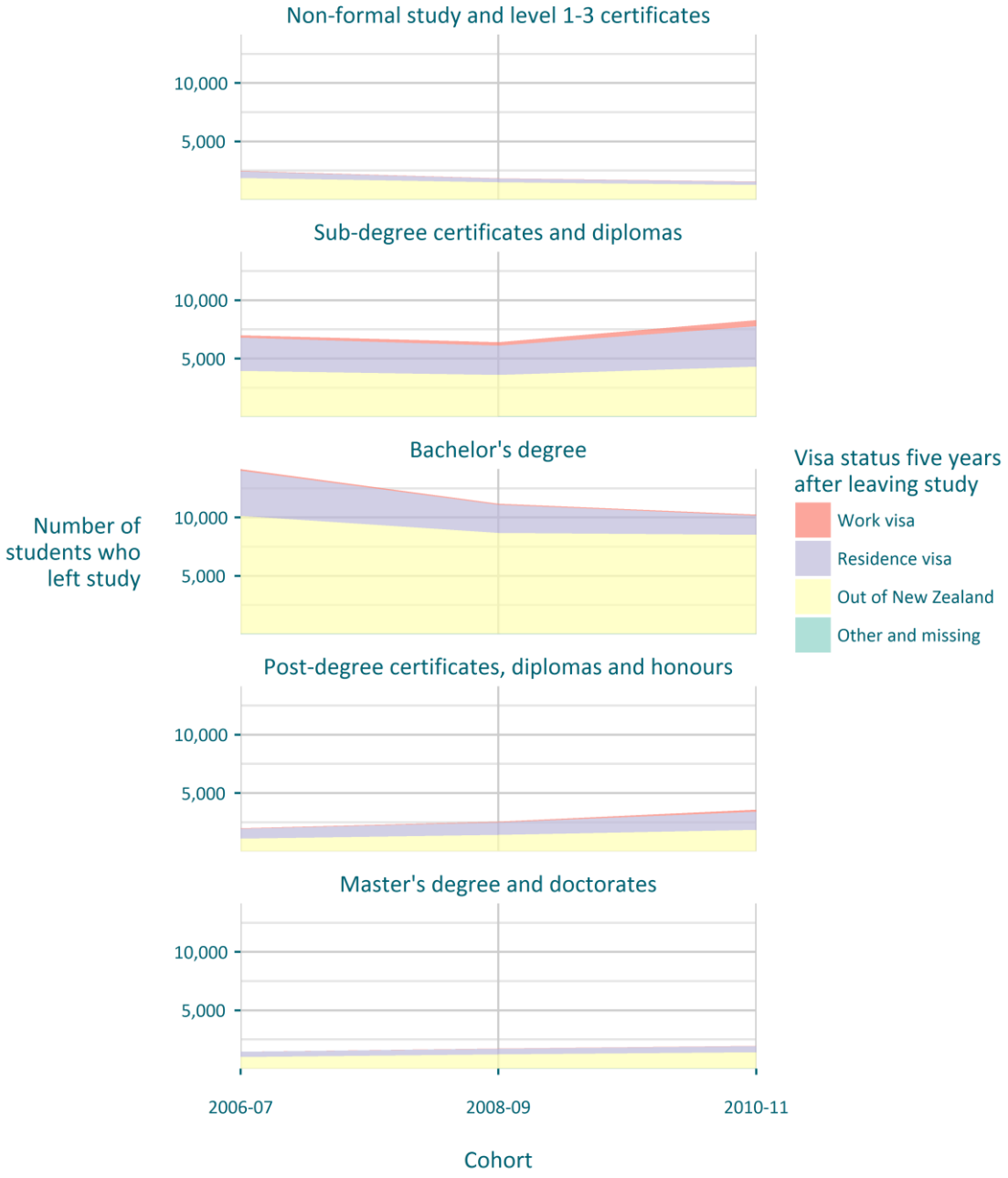
Former students who studied sub-degree and post-degree level certificates and diplomas were the most likely to still be in New Zealand five years after leaving study

Five years after leaving study, 51–56% of sub-degree certificate and diploma former students and 51–56% of post-degree certificate and diploma former students had left New Zealand compared with 74–81% of level 3 and non-formal study former students, 71–83% of bachelor's former students, and 67–71% of master's and doctorate former students.

This could relate to the work and residence visa opportunities afforded by study in New Zealand. From 2008 to 2010, qualifications at or above level 4 gave former students five bonus points towards an SMC residence visa, and, from 2011, bachelor's degrees or qualifications at level 8 gave 10 bonus points (Appendix 1). Post-degree certificates and diplomas that would allow a former student at this time to qualify for a post-study work visa were of shorter duration than sub-degree or degree level qualifications. If visa eligibility influences students' course choices, we would expect to find that the students who stay in New Zealand tend to study at the minimum qualification level or the shortest duration required for the maximum number of points.

While no large changes in the likelihood of different visa outcomes across cohorts were evident, it may be notable that the proportion of sub-degree and post-degree certificate and diploma former students on work visas doubled from 2–3% in 2006–07 to 5–6% in 2010–11.

Figure 8. Visa status, five years after leaving study, of international tertiary students who left study from 2006–07 to 2010–11, by level of study and cohort



Source: Matched migration spells and SDR data (IDI).

Note: Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

More than half the former students who obtained New Zealand residence transitioned via a work visa

Across all nationalities, institutions, fields and levels of study, the most common pathway was to leave New Zealand within the first year after study and to remain out of New Zealand (Figure 9). Of the former students who had held a work visa one year after study, most either transitioned to a residence visa or left New Zealand five years after study. While some former

students were already on a residence visa one year after study, a more common pathway was to transition to residence via a work visa, obtaining residence either between one and three years or between three and five years after study (Figure 9).

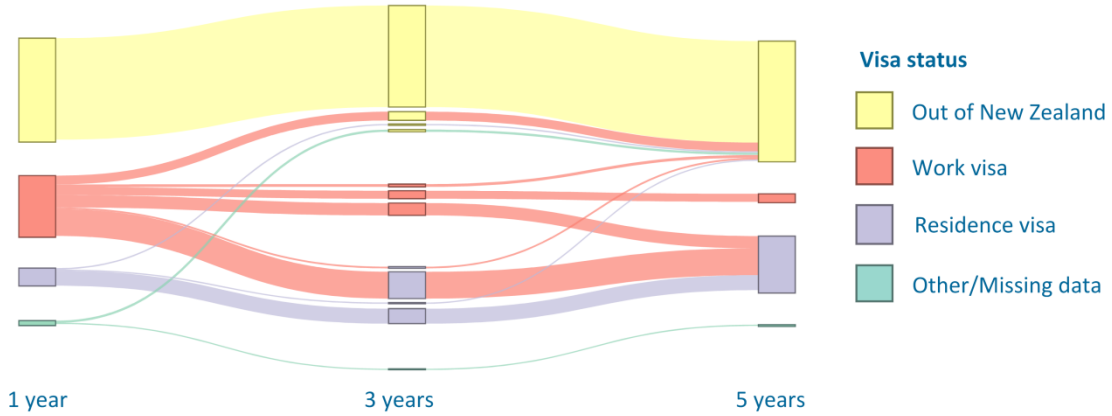
The following section focuses on the latest cohort for which we have five-year outcomes, the 2010–11 cohort.

Notes on reading the figures

In Figures 9–12, the boxes show the proportion of former students with each visa status at one, three and five years after study. Lines between each box show the flows of former students between the visa statuses at years one, three and five. Box and line heights are scaled to the proportion of former students, and lines are coloured according to the one-year status.

Pathways taken by 0.5% or fewer former students have been deleted to improve clarity. The other/missing visa status has been retained at five years, but removed at one and three years because there were no pathways through it that involved more than 0.5% of former students.

Figure 9. Visa pathways of international tertiary students who left study in 2010 and 2011



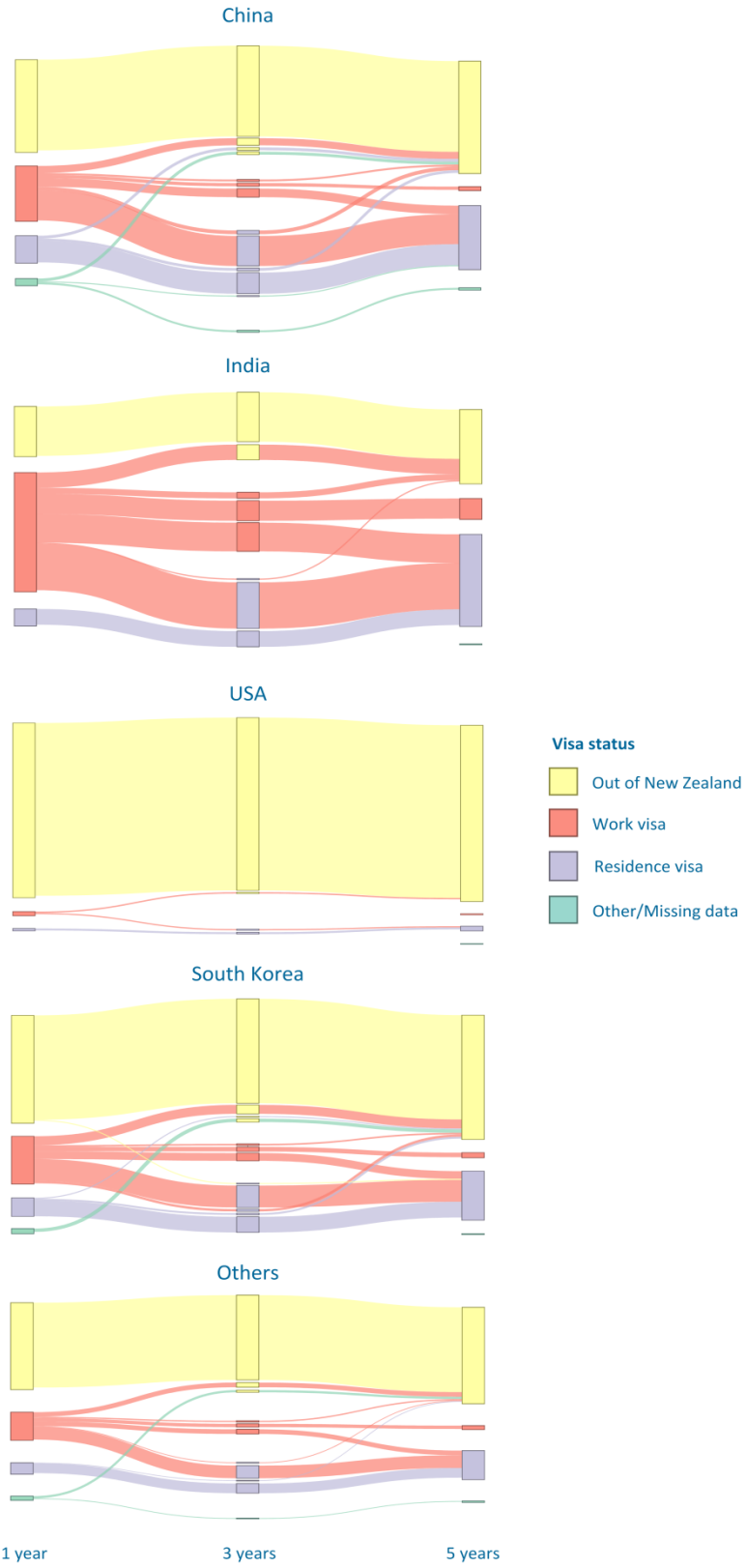
Source: Migration spells dataset.

Note: Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

Indian former students were the most likely to have transitioned to residence via a work visa

Different nationalities have different visa transition patterns. For example, Indian former students are far more likely to be on a work visa at year one and to have transitioned to residence by year five than other nationalities (Figure 10). Former students from China were more likely to have moved to residence at year one than other nationalities and very few were on work visas at year five. Students of South Korean and 'Other' nationalities were similar in that a fifth to a quarter transitioned to a work visa at year one, and then about half of the year one work visa students transitioned to residence by year three, and half again by year five. Students from the USA are unusual in that the vast majority had left New Zealand by year one. For the actual number of former students by nationality, see Figure 1.

Figure 10. Visa pathways of international tertiary students who left study in 2010 and 2011, by nationality



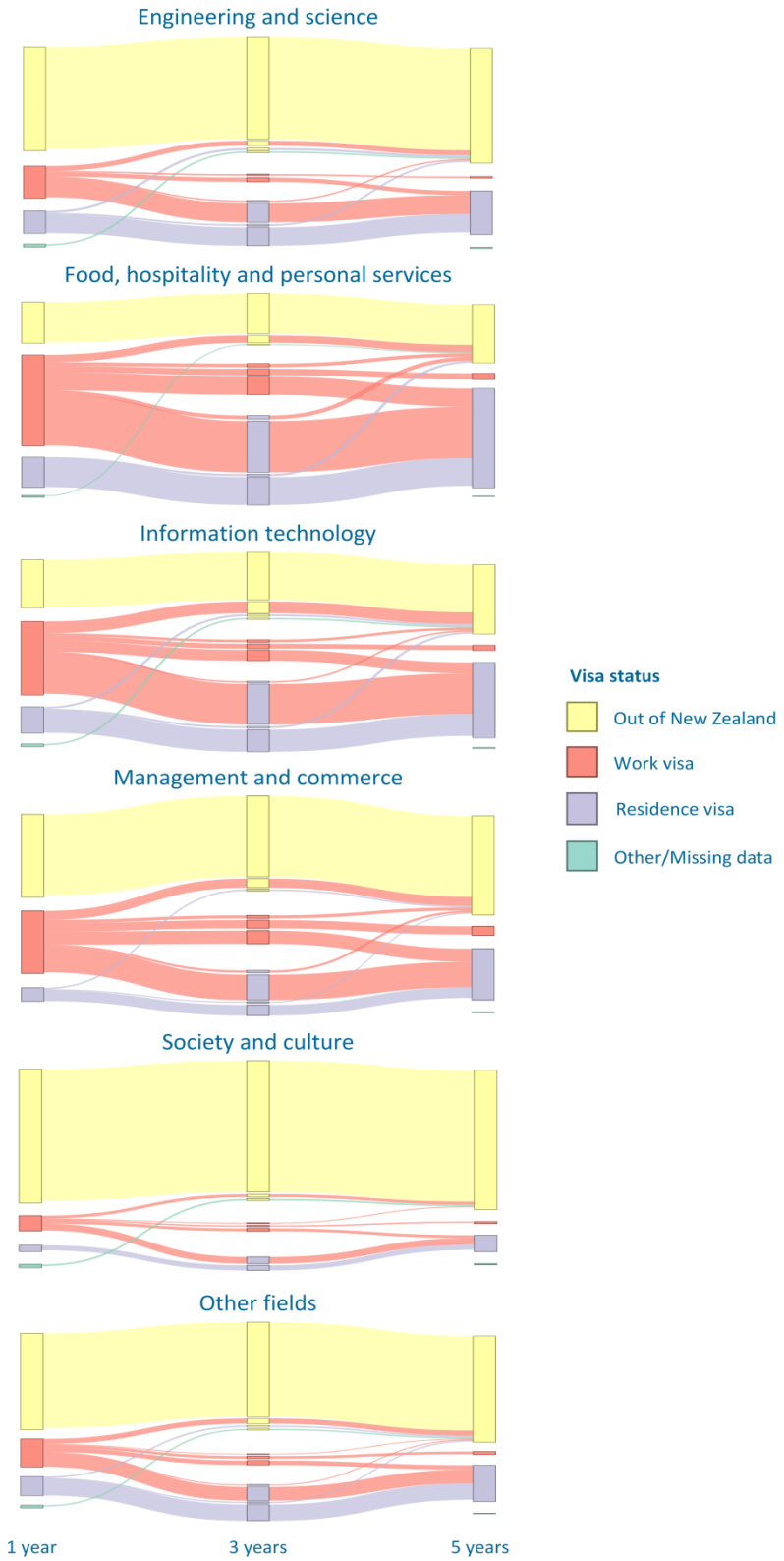
Source: Migration spells dataset.

Note: Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

Visa transition patterns differ across fields of study

Some differences exist in visa transition pathways by field of study, with those former students who studied food, hospitality and personal services, information technology or management and commerce more likely to be on a work visa at year one and to have transitioned to residence by year five than other fields (Figure 11). Very few of those who studied engineering and science were still on a work visa by year five, with around a quarter on residence visas and the remainder out of the country , and the great majority of students who studied society and culture had left New Zealand by year one. For the actual number of former students by field of study, see Figure 4.

Figure 11. Visa pathways of international tertiary students who left study in 2010 and 2011, by field of study



Source: Migration spells–SDR matched data.

Note: Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

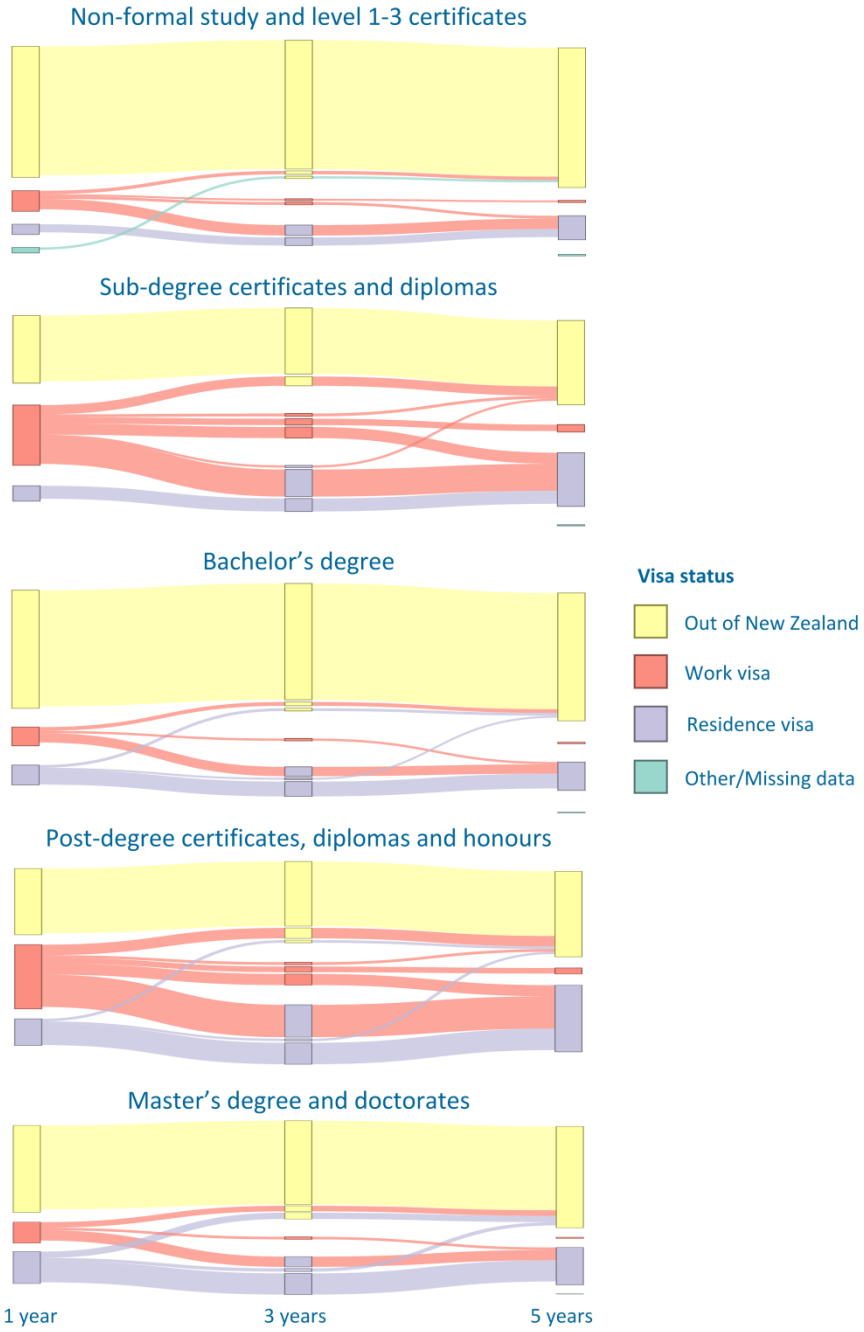
Those who studied sub-degree or post-degree certificates and diplomas had similar pathways and were most likely to have transitioned from a work visa to residence

Some differences exist in the visa transition pathways by level of study, with those who studied sub-degree and post-degree certificates and diplomas the most likely to be on a work visa at 1 year and to have transitioned to residence by year five (Figure 12).

Very few non-formal students, bachelor's degree students, or master's degree and doctoral students were still on work visas by year five.

For the actual number of former students by level of study, see Figure 3.

Figure 12. Visa pathways of international tertiary students who left study in 2010 and 2011, by level of study



Source: Migration spells–SDR matched data.

Note: Appendix 2 defines the visa statuses. Students who were "Out of New Zealand" were not in New Zealand five years after leaving study and had not been in New Zealand for at least six months before then.

3. Visa sub-types

Most of the former students who stayed in New Zealand transitioned to a Skilled Migrant Category residence visa

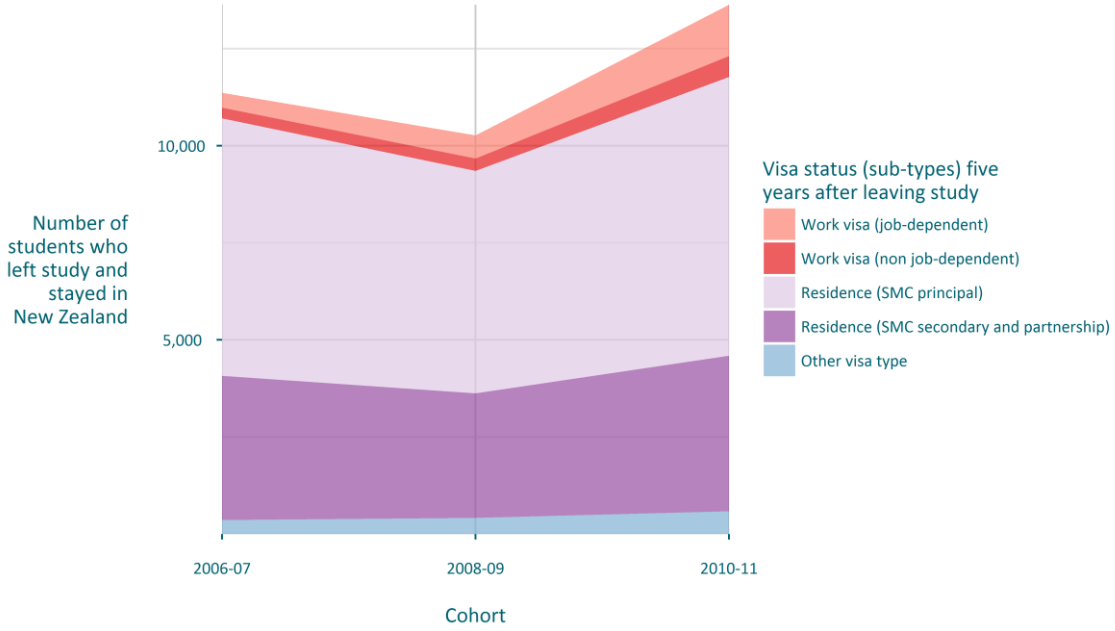
Figure 13 provides information on the types of visas held by the former students who were in New Zealand five years after leaving study. Just over half (55%) of the former students who stayed in New Zealand transitioned to an SMC residence visa as a principal applicant, while 31% gained residence through Partnership or as a secondary SMC, 7% transitioned to a job-dependent work visa and 3% transitioned to a non–job-dependent work visa. Appendix 2 lists the visa types that are included in these groups.

Compared with earlier cohorts, the 2010–11 cohort was less likely to transition to a principal SMC visa and more likely to transition to a work visa (Figure 13). The percentage of principal SMC visa holders decreased from 58% in 2006–07 to 53% in 2010–11, while the percentage on a job dependent work visa increased from 3% to 10% and the percentage on a non–job-dependent work visa increased from 2% to 4%.

Former students are competing for a limited number of places in the SMC as the residence programme has an upper limit set by Cabinet. The increasing numbers of former students who want to transition puts more pressure on the category, so the selection criteria are adjusted to manage demand. There is no restriction on the number of Partnership or Essential Skills visa that can be granted in any year (or multi-year period).

Note that our data covers all international students who left study and does not distinguish between students who did or did not complete qualifications. Students who do not complete qualifications do not gain points towards the SMC and are not eligible to apply for Study to work visas (Appendix 1).

Figure 13. Visa sub-types five years after leaving study, of international tertiary students who left study from 2006–07 and 2010–11 and stayed in New Zealand, by cohort



Source: Migration spells dataset (MBIE).

Note: Data is not shown for students with the visa status "Out of New Zealand" or "Other/Missing data".

For information about which visas are in each category, see Appendix 2, Visa sub-categories.

As the number of Chinese former students transitioning to the Skilled Migrant Category has declined, the number from India has increased

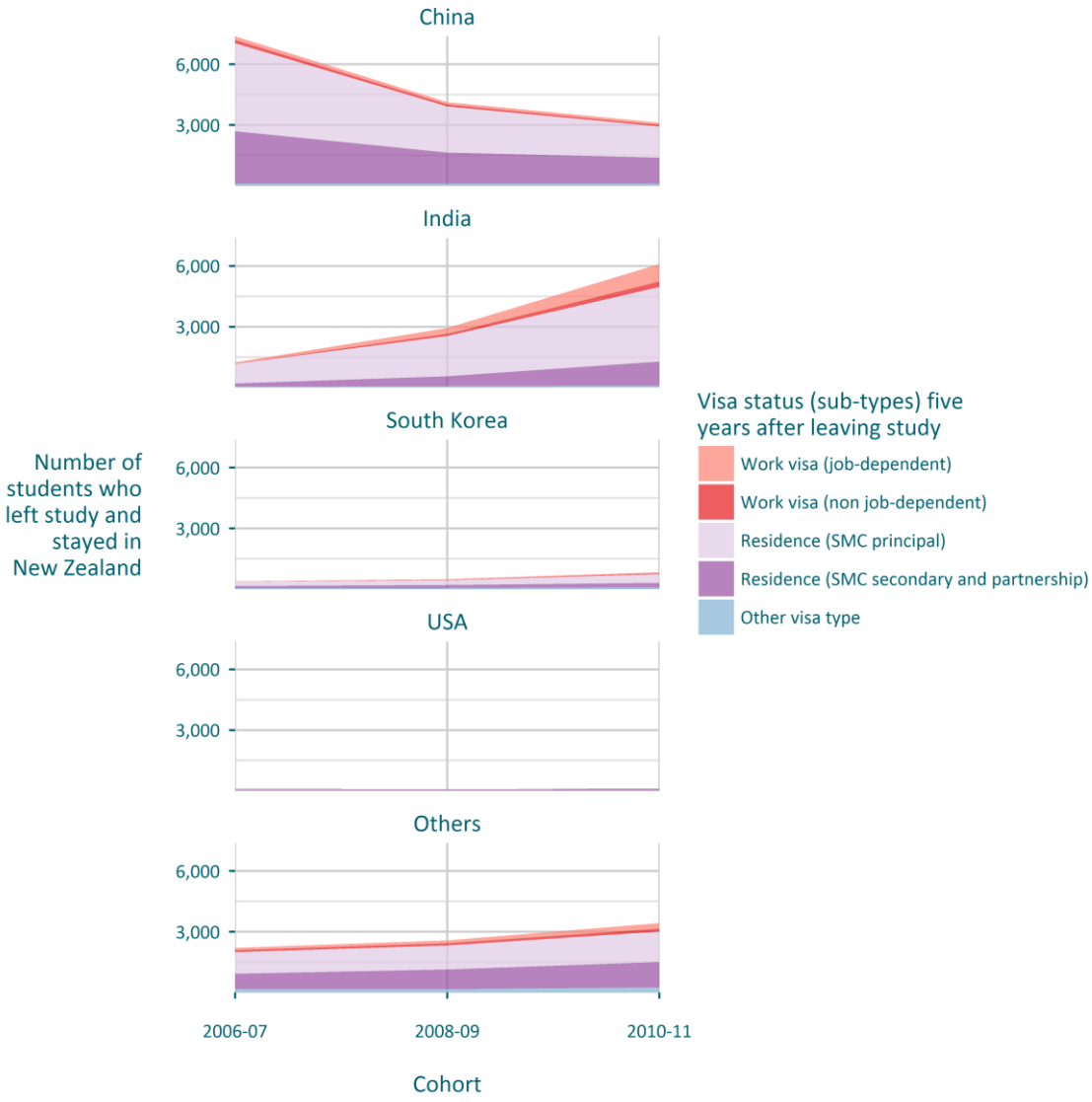
Across all of the nationality groupings except the USA, principal SMC visas were the most common visa type five years after study, followed by secondary SMC visas and Partnership residence visas (Figure 14). Among former students from the USA, secondary SMC visas and Partnership residence visas were more common, but numbers were low overall because most former students left New Zealand.

Among Chinese and Indian former students between the 2006–07 and 2010–11 cohorts, the proportion who transitioned to principal SMC visas decreased (from 59% to 49% for Chinese former students and from 77% to 60% for Indian former students) and the proportion who transitioned to a secondary SMC visa or Partnership residence visa increased (from 35% to 41% for Chinese former students and from 13% to 19% for Indian former students).

The most marked increase in the proportion of former students transitioning to work visas was among Indian former students, with the proportion on job-dependent work visas more than tripling between the 2006–07 and 2010–11 cohorts (from 4% to 14%) and the proportion on non–job-dependent work visas increasing (from 1% to 4%).

For former students of South Korean and "Other" nationalities, there was little proportional change in visa sub-type outcomes, despite the overall increase in numbers (Figure 14).

Figure 14. Visa sub-types five years after leaving study, of international tertiary students who left study from 2006–07 to 2010–11, and stayed in New Zealand, by nationality and cohort



Source: Migration spells dataset (MBIE).

Note: Data is not shown for students with the visa status "Out of New Zealand" or "Other/Missing data".

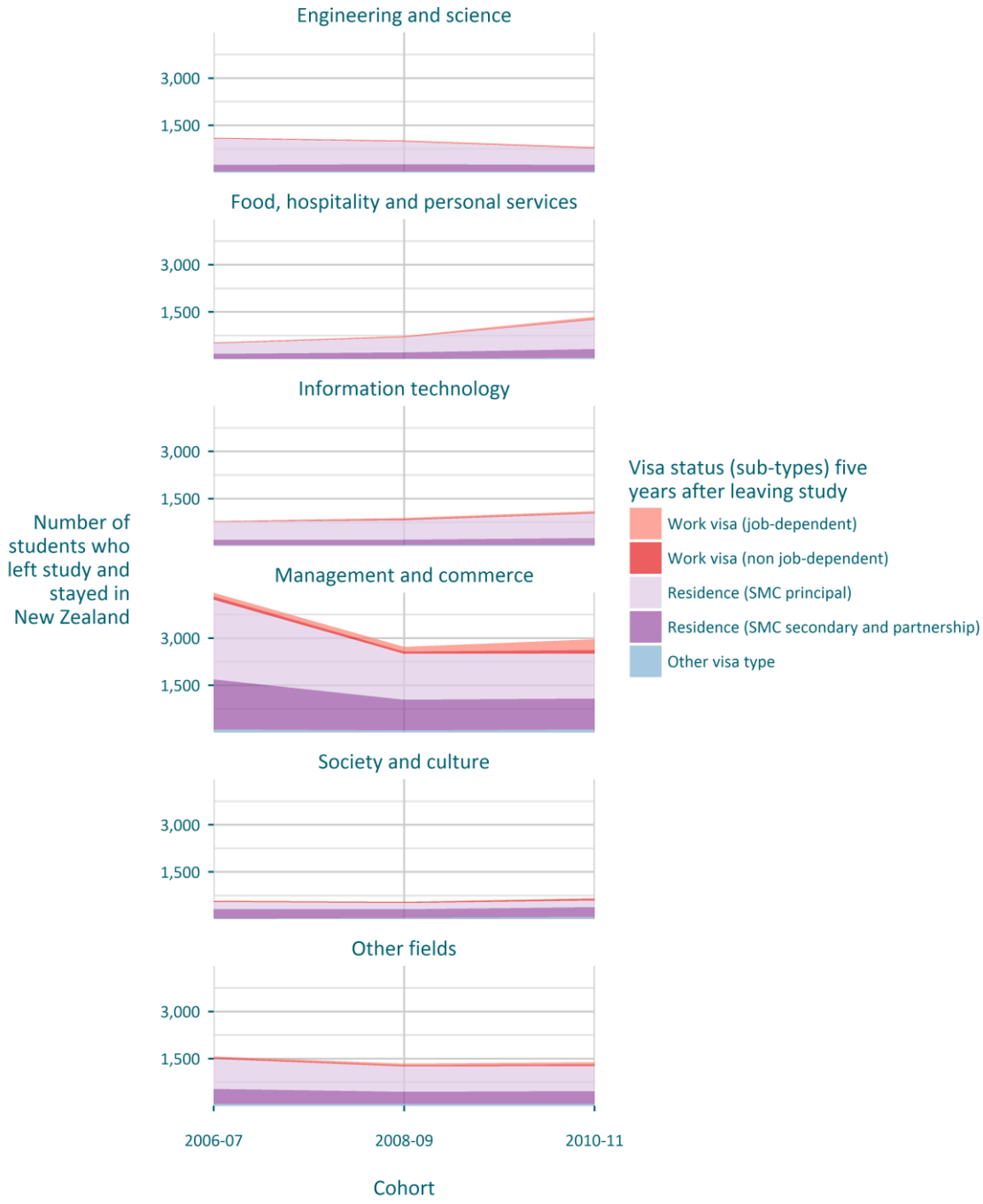
For information about which visas are in each category, see Appendix 2, Visa sub-categories.

Former students who studied engineering and science or information technology were most likely to have gained principal Skilled Migrant Category visas

Among the former students who remained in New Zealand five years after study, those who had studied engineering and science or information technology were more likely to go on to be a principal SMC visa holder (71%). Former students who had studied society and culture were more likely than others to transition to a secondary SMC or Partnership residence visa (49%) and less likely than others to transition to a principal SMC visa (36%). Former students who had studied management and commerce were more likely than others to be on a job-dependent work visa five years after studying (6% of former students compared with 3–4% of former students who had studied other fields).

A decrease between the 2006–07 and 2010–11 cohorts in the proportion of former students who went on to become principal SMC visa holders is apparent across all fields except for food, hospitality and personal services (which had an increase in the proportion progressing to this visa type). An increase in the proportion transitioning onto job-dependent work visas is apparent across all fields, and is particularly marked for the management and commerce field, which saw an increase from 3% to 12%.

Figure 15. Visa sub-types five years after leaving study, of international tertiary students who left study from 2006–07 to 2010–11, and stayed in New Zealand, by field of study and cohort



Source: Matched migration spells dataset and SDR data (IDI).

Note: Data is not shown for students with the visa status “Out of New Zealand” or “Other/Missing data”.

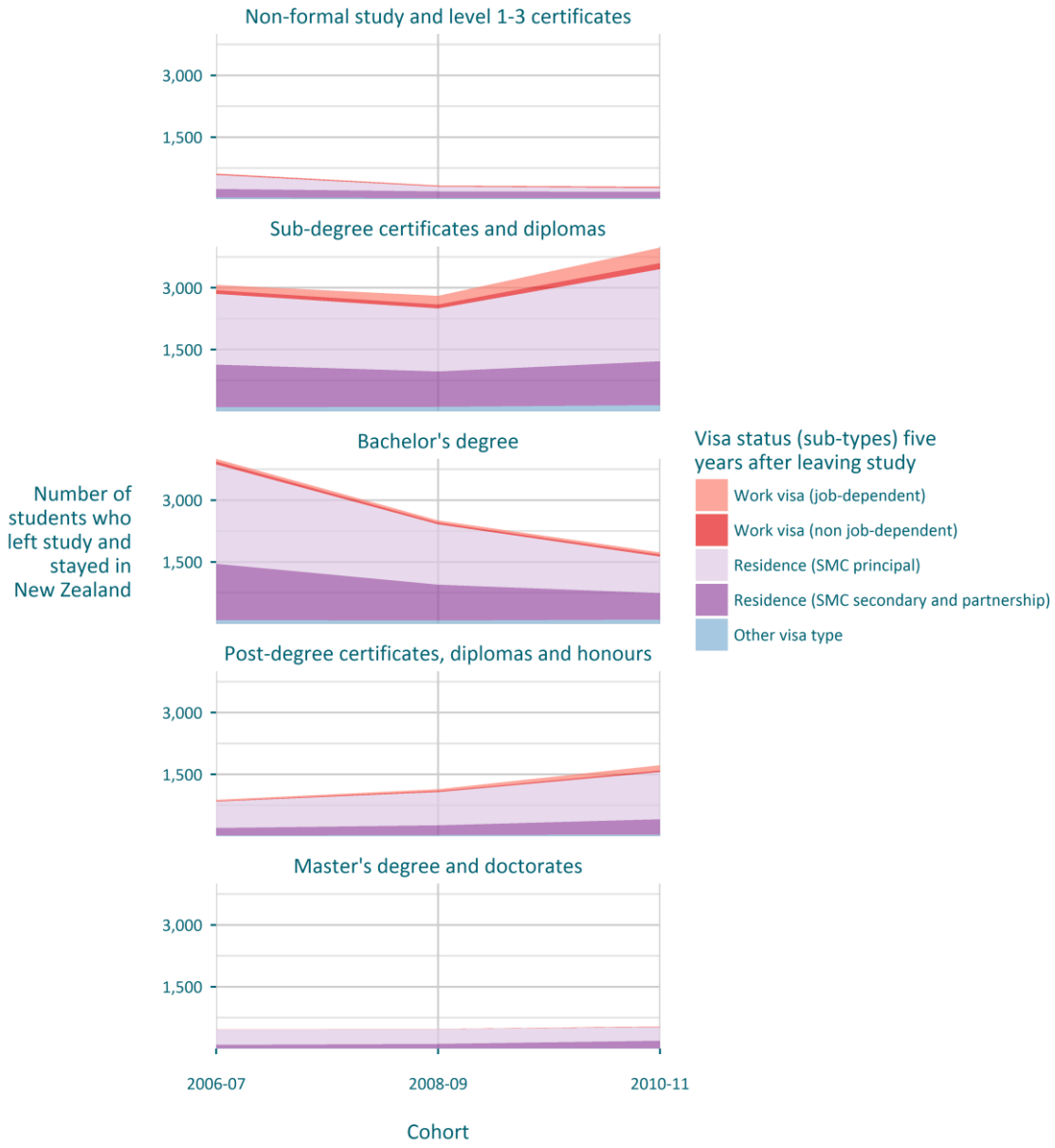
For information about which visas are in each category, see Appendix 2, Visa sub-categories.

Higher levels of study are associated with higher rates of transition to principal SMC visas

Among former students who stayed in New Zealand, those who studied at higher levels were more likely to transition to a principal SMC visa (figure 16). The proportion transitioning to this visa rose at each level, from 44% of the former students who studied non-formal and level 1–3 courses, through to 71% of the former students who had studied at master's or doctoral level. Holding a job-dependent work visa five years after study was more common for former students who had studied sub-degree certificates and diplomas (7% of these former students) and post-degree certificates, diplomas, and honours (5% of these former students).

A decrease between the 2006–07 and 2010–11 cohorts in the proportion of former students who went on to become principal SMC visa holders is apparent across all levels of study except for sub-degree certificates and diplomas, where the proportion remained roughly the same (figure 16). An increase in the proportion transitioning onto job-dependent work visas is apparent across all levels of study.

Figure 16. Visa sub-types five years after leaving study, of international tertiary students who left study from 2006–07 to 2010–11, and stayed in New Zealand, by level of study and cohort



Source: Matched migration spells dataset and SDR data (IDI).

Note: Data is not shown for students with the visa status “Out of New Zealand” or “Other/Missing data”.

For information about which visas are in each category, see Appendix 2, Visa sub-categories.

4. Labour market outcomes

Most former students who stayed in New Zealand were employed one, three and five years after leaving study

Matched migration spells and tax data suggests that most of the former students who stayed in New Zealand after leaving study were employed.[9] For the 2006–07, 2008–09 and 2010–11 cohorts:

- one year after leaving study, 76–81% were employed
- three years after leaving study 74–79% were employed
- five years after leaving study, 70–76% were employed.

For each cohort, the proportion employed decreased slightly over time, with a lower proportion employed at five years than at one year.

This section focuses on the latest cohort for which we have employment status and earnings outcomes at five years, the 2010–11 cohort. Previous cohorts showed similar patterns so are not considered here.

How to read the figures

Dashed lines in Figures 17–23 indicate the overall percentage employed and median earnings for all visa types.

On the right in each figure, the number of former students who were employed five years after leaving study is given, but these numbers have been subjected to graduated random rounding to preserve confidentiality, so are indicative only.

Data is not shown for the small number of former students whose year five visa status was "other/missing data".

For comparison purposes, the median monthly wage or salary in 2015 was $3,822.[10]

Caution is needed when interpreting the earnings figures as the IDI does not tell us how many hours were worked. It is possible that some groups may work longer hours than other groups and push up the median earnings for that group.

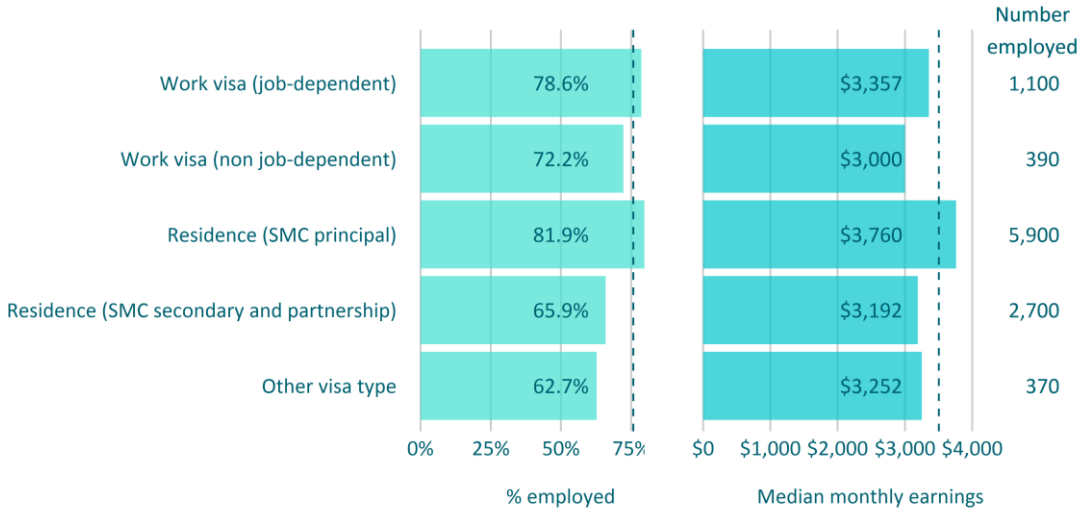
[9] Employment rates for a given cohort and year after leaving study are calculated as follows. The number of students that were matched between the migration spells and tax datasets and classified as employed in the tax dataset, divided by the number of students in the spells dataset who were in New Zealand. This calculation does not account for the possible loss of some students due to incomplete matching between the spells and tax datasets, and it is not possible to estimate this match rate. It also does not include self-employed. Therefore, the rates of employment presented in this section may be underestimated, but comparisons between groups are still possible.

[10] Statistics New Zealand. *DataHub table viewer* (table of earnings from main wage and salary job by occupation (ANZSCO 2006), sex, age groups, and ethnic groups). Retrieved on 12 December 2017 from: http://nzdotstat.stats.govt.nz/wbos/Index.aspx. Median monthly earnings are calculated by multiplying median weekly earnings by 52 and dividing by 12. Whilst this calculation will not be exact, it provides a. close approximation.

Employment rates and earnings were highest among former students who transitioned to job-dependent work visas and principal Skilled Migrant Category visas

For the 2010–11 cohort, the highest employment rates and earnings five years after leaving study were among former students who had transitioned to job-dependent work visas and principal SMC visas (Figure 17). As might be expected, employment rates and earnings were lower among those on non-job dependent work visas and secondary SMC and Partnership residence applicant visas. Most of these former students were employed, however.

Figure 17. By visa status, the proportion of international tertiary students who left study in 2010 and 2011 and were employed five years later (left panel) and their median monthly earnings (right panel)



Source: Matched migration spells and tax data (IDI).

Note: Data is not shown for students with the visa status "Out of New Zealand" or "Other/Missing data".

For information about which visas are in each category, see Appendix 2, Visa sub-categories.

Nationality and field of study are the strongest predictors of employment status

Statistical modelling of the associations between employment status and the five factors of cohort, nationality, institution, field of study and level of study, showed that all five factors had statistically significant associations with the probability of a former student being employed five years after leaving study, and that there were interactions between them (Appendix 4). This means that cohort, nationality, institution, field of study and level of study all make important contributions to predicting the likelihood of employment for former students who stay in New Zealand.

Further analysis of the relative importance of the five factors indicated that nationality contributed the most to explaining the employment outcomes of former students (Appendix 4).

Nationality, institution, field of study, and level of study are all important predictors of earnings

Statistical modelling of the associations between employed former students' earnings five years after leaving study and the four factors of nationality, institution, field of study and level of study, showed that all four factors had statistically significant associations with former students' later earnings and that there were interactions between them (Appendix 5).

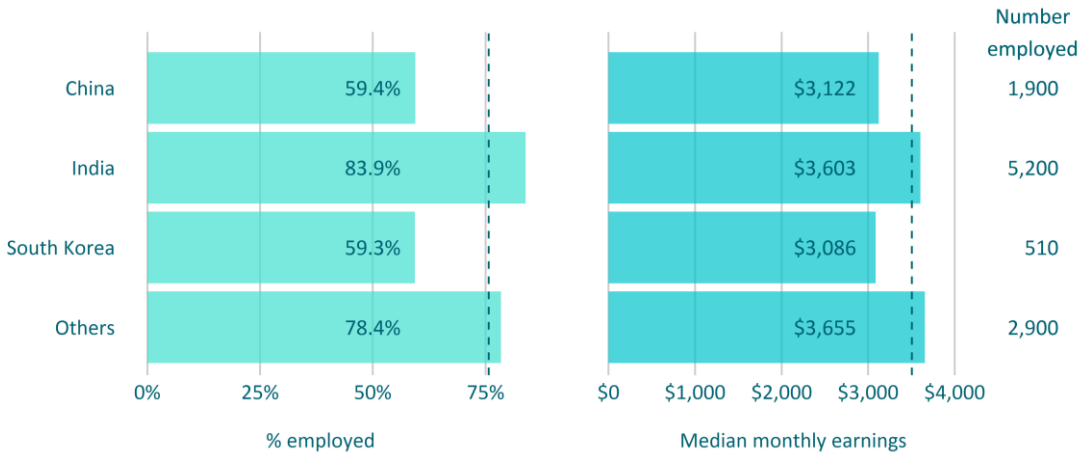
Further analysis of the relative importance of the four factors indicated that there was little difference in the importance of the four predictors; all were important predictors of former students' earnings (Appendix 5).

Differences in employment rates and earnings across nationalities, levels of study, and fields of study are apparent

The following figures show the proportion of former students who were employed and the median earnings among employed former students, five years after study, by nationality, level of study and field of study.

Chinese and South Korean former students were less likely to be employed than Indian former students and former students of other nationalities, and the employed Chinese and South Korean former students also tended to earn less (Figure 18).

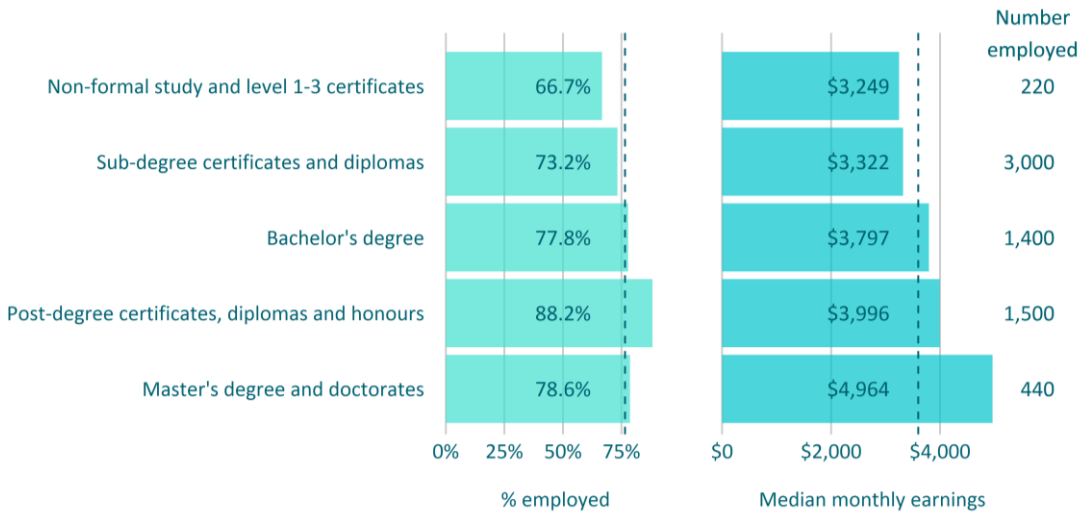
Figure 18. By nationality, the proportion of international tertiary students who left study in 2010 and 2011 and were employed five years later (left panel) and their median monthly earnings (right panel)



Source: Matched migration spells and tax data (IDI).

Employment rates five years after leaving study increased as former students' level of study increased, up to the post-degree certificate, diploma and honours level, and dropped off again for former students who had studied at master's degree and doctoral levels. Median earnings increased with the level of study and were markedly higher for master's degree and doctorate former students (Figure 19).

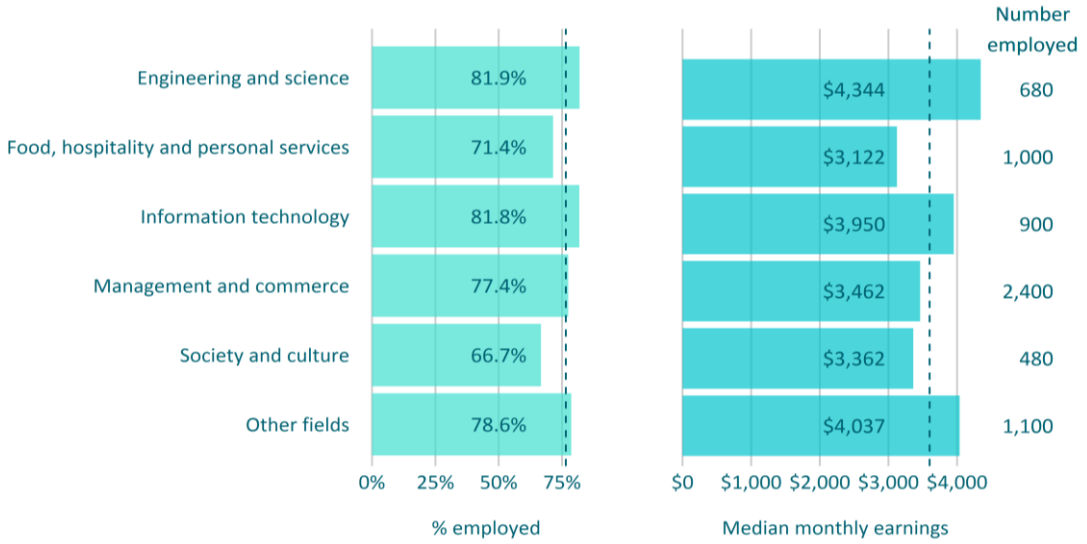
Figure 19. By level of study, the proportion of international tertiary students who left study in 2010 and 2011 and were employed five years later(left panel), and their median monthly earnings (right panel)



Source: Matched migration spells, SDR and tax data (IDI), 2010–11 cohort only.

Employment rates five years after leaving study were the highest among former students who studied engineering and science and information technology, and lowest among former students who studied society and culture and food, hospitality, and personal services. The most popular field of study, management and commerce, was associated with a slightly above average employment rate and below average earnings (Figure 20). Former students who studied engineering and science, information technology and "other fields" had the highest median earnings, while those who studied food, hospitality and personal services had the lowest (Figure 20).

Figure 20. By field of study, the proportion of international tertiary students who left study in 2010 and 2011 and were employed five years later (left panel) and their median monthly earnings (right panel)



Source: Matched migration spells, SDR and tax data (IDI).

Most of the employed former students were in the Auckland region

Five years after leaving study, around 62% of former students who were employed in New Zealand were in the Auckland region (Figure 21).

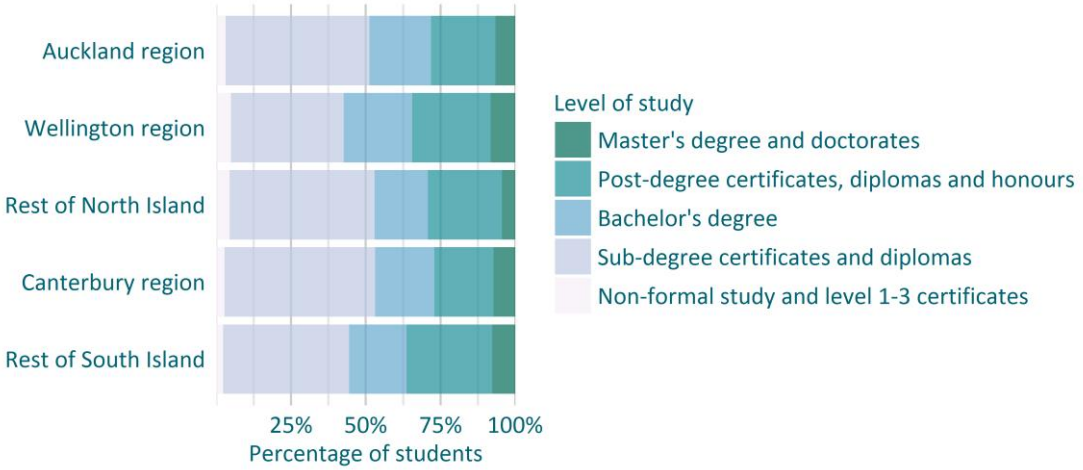
Although median earnings by region varied, the differences were fairly small (compared with, for example, the differences between former students who studied at different levels) (Figure 21).

Figure 21. By region, median earnings among employed international tertiary students who left study in 2010 and 2011 who were in New Zealand five years after leaving study

Source: Matched migration spells and tax data (IDI).

An investigation of whether former students who studied at different levels tended to be employed in different regions showed differences between regions, but no clear pattern (Figure 22). Auckland, Canterbury and the North Island areas outside Wellington and Auckland employed higher proportions of former students who had studied at sub-degree level (Figure 22).

Figure 22. By region, the proportion of employed international tertiary students who left study in 2010 and 2011 (five years after leaving study) who had studied at each level

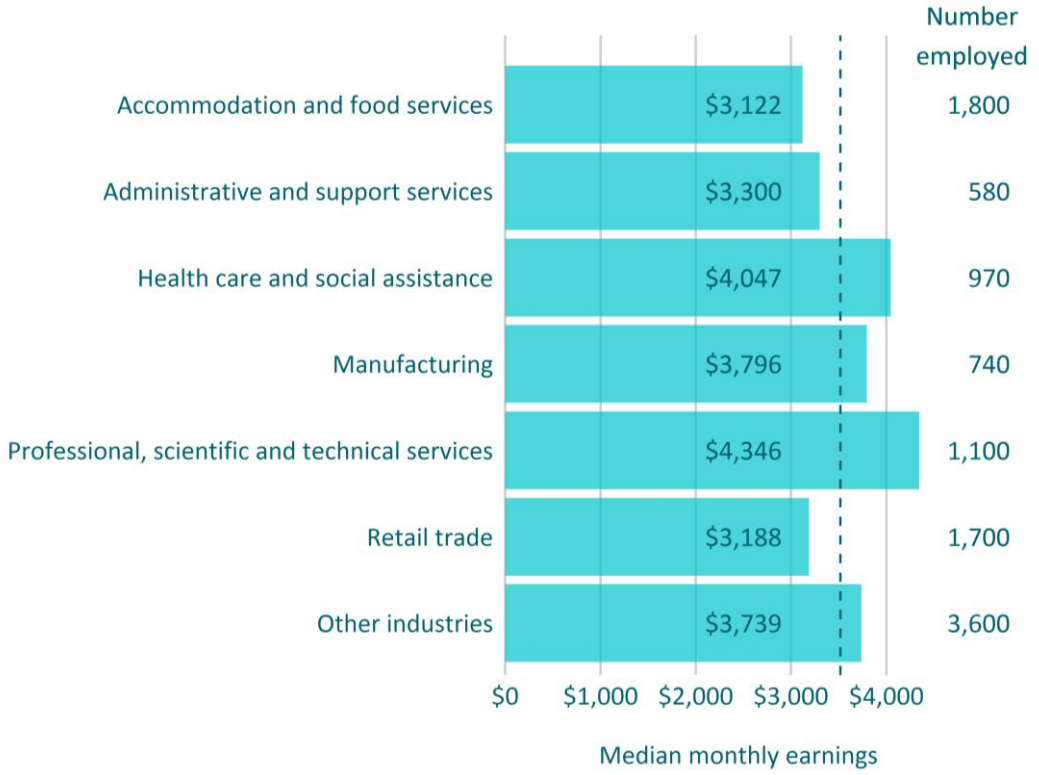


Source: Matched migration spells, SDR and tax data (IDI).

Former students who went on to work in professional, scientific and technical services had the highest median earnings

Industry of employment appears to be associated with differences in earnings. Median earnings were higher for former students employed in the professional, scientific and technical services and the health care and social assistance industries (Figure 23). The retail trade and accommodation and food services industries employed large numbers of former students compared with other industries, but also had the lowest median earnings (Figure 23).

Figure 23. By industry, median earnings among employed international tertiary students who left study in 2010 and 2011 who were in New Zealand five years after leaving study



Source: Matched migration spells and tax data (IDI).

Former students' earnings increased during the first five years after study

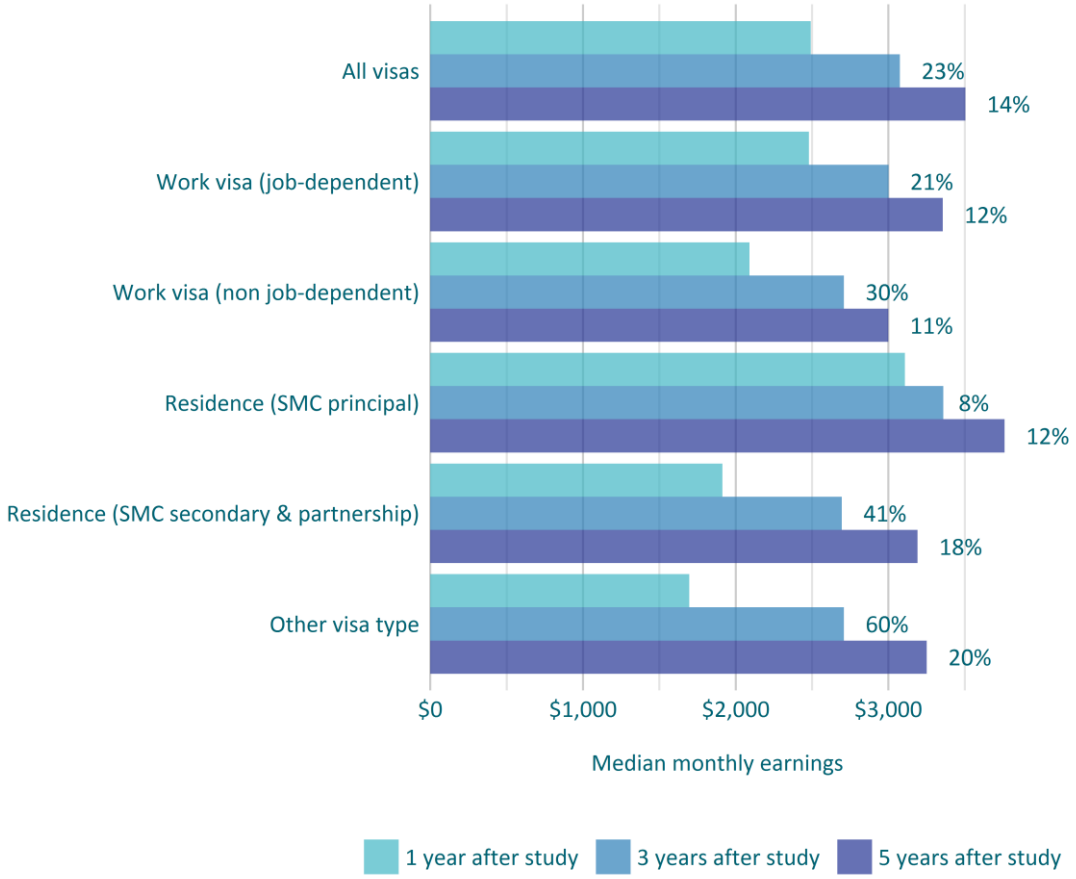
To estimate the extent to which different groups experience earnings progression, we compared the median earnings of former students who left study in 2010–11 and were employed in New Zealand one, three and five years after leaving study. These results are estimates only, because the analysis compares median earnings at different time points, rather than tracking earnings changes for individual students. This could be affected by differential attrition. For example, if the former students who left New Zealand between years one and five were predominantly those with lower earnings, it would increase median earnings at later time points, elevating the apparent earnings progression.

In Figures 24–27, the bars indicate the median monthly earnings of former students at one, three and five years after leaving study, and the percentages to the right of the bars indicate the change between time points.

Across all visa types and nationalities, the median earnings of former students who left study in 2010–11 increased by 23% between one and three years after study and increased by a further 14% between three and five years after study (Figure 24).

When disaggregated by visa type, the earnings progression appears to be faster for visa types with lower median earnings in the first year of study. That is, while former students on non–job-dependent work visas, Partnership and secondary SMC visas, and other visa types start with much lower earnings than principal SMC visa holders, their earnings increase at a faster rate, and by year five their median earnings have caught up with or surpassed the median earnings that principal SMC visa holders had at year one (Figure 24). This result could be affected by differential rates of earnings progression and by former students earning lower earnings taking longer to transition to principal SMC visas (as they transfer into the principal SMC pool between one and five years after study, their lower earnings could depress the median earnings for that group.

Figure 24. By visa status, earnings progression among international tertiary students who left study in 2010 and 2011 and were employed in New Zealand



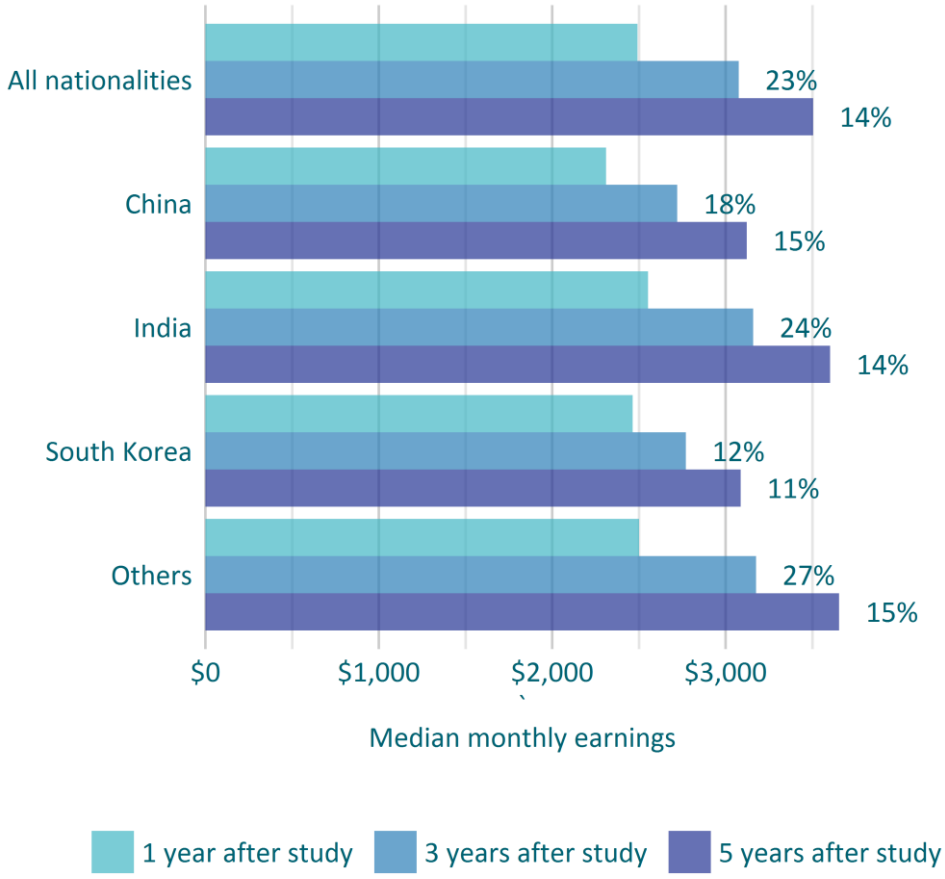
Source: Matched migration spells and tax data (IDI).

Note: Data is not shown for students with the visa status “Out of New Zealand” or “Other/Missing data”.

For information about which visas are in each category, see Appendix 2, Visa sub-categories.

Earnings progression appears mostly similar across nationalities, but the rate appears to be lower among South Korean former students (Figure 25). While the median earnings of Chinese former students is lower at one, three and five years after study, their rate of increase is fairly similar to that of other nationalities (Figure 25).

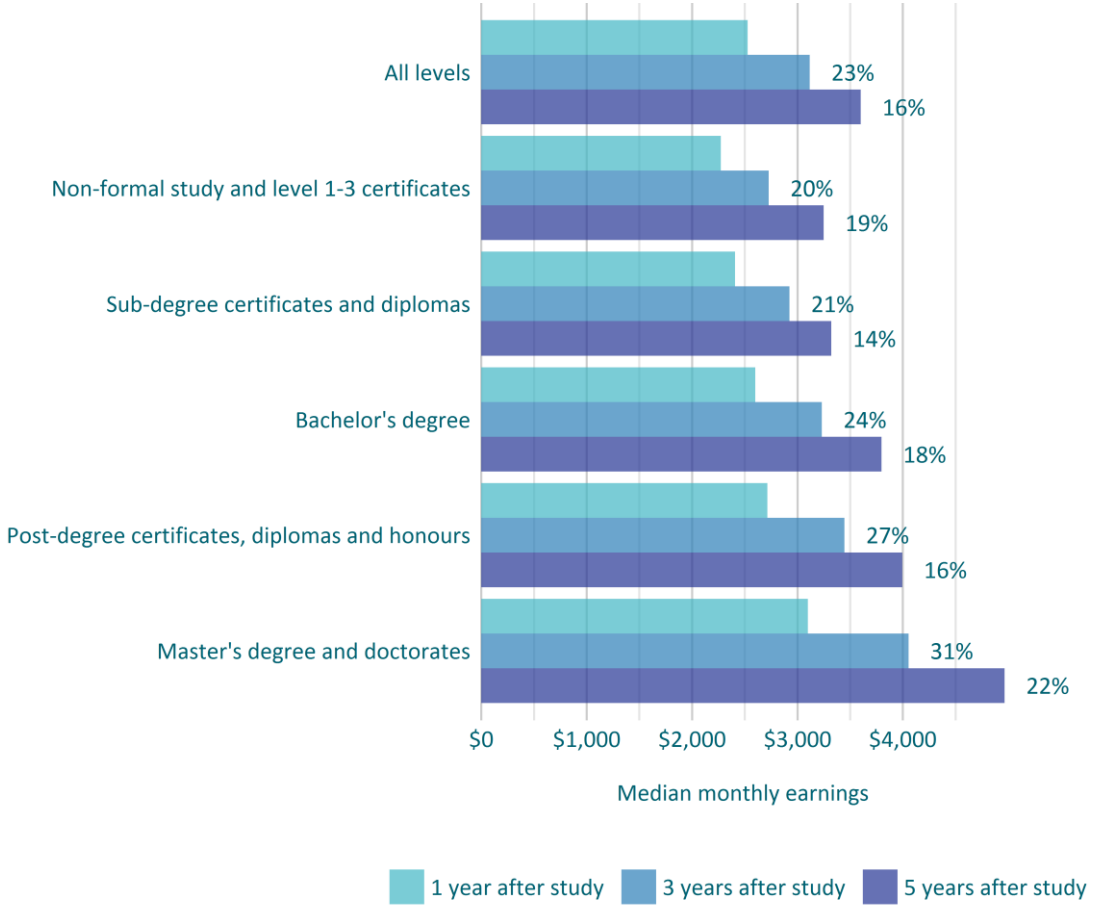
Figure 25. By nationality, earnings progression among international tertiary students who left study in 2010 and 2011 and were employed in New Zealand



Source: Matched migration spells and tax data (IDI).

Median earnings were fairly similar across levels of study, one year after leaving study. However, the rates of progression were higher for former students who had studied at bachelor's level and above. At bachelor's and higher levels, progression rates increased with increasing levels of study (Figure 26).

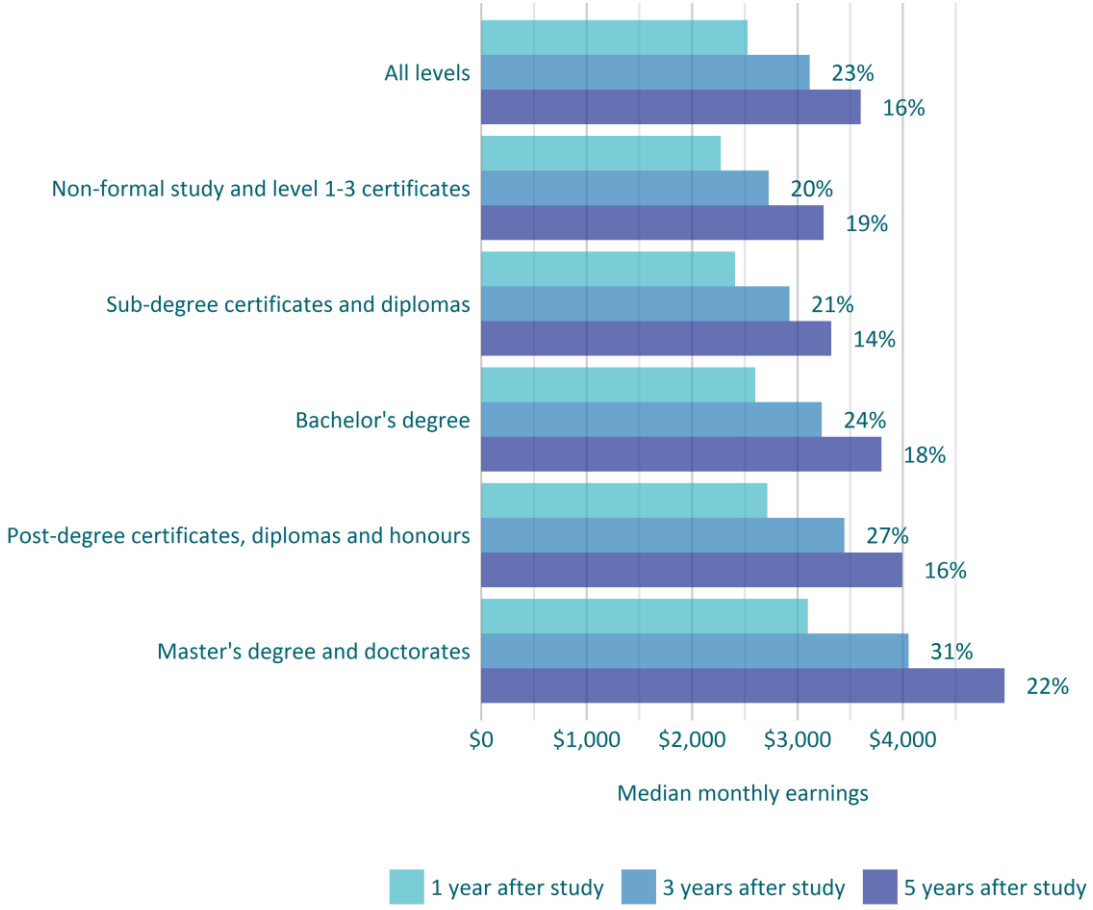
Figure 26. By level of study, earnings progression among international tertiary students who left study in 2010 and 2011 and were employed in New Zealand



Source: Matched migration spells, SDR and tax data (IDI).

By field of study, former students who had studied engineering and science and information technology had somewhat higher rates of earnings progression, while those who had studied food, hospitality and personal services had lower progression rates (Figure 27).

Figure 27. By field of study, earnings progression among international tertiary students who left study in 2010 and 2011 and were employed in New Zealand



Source: Matched migration spells, SDR and tax data (IDI).

5. Year three visa and labour market outcomes

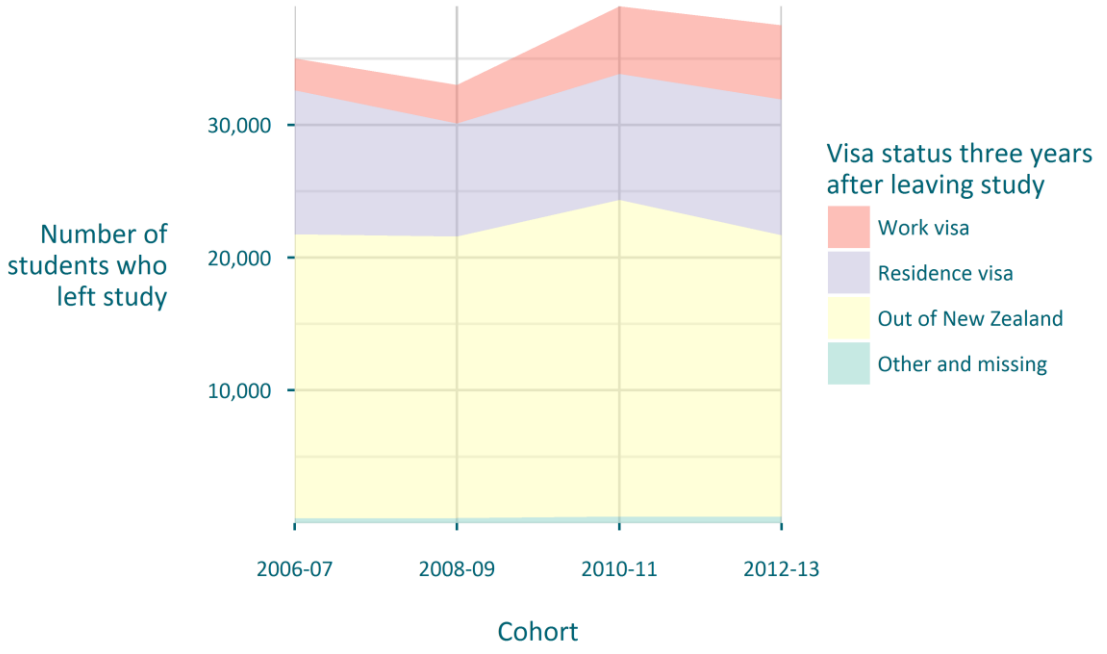
This section describes former students' visa, employment and earnings outcomes three years after leaving study. We can look at these outcomes for the more recent 2012–13 cohort (for whom we do not yet have five-year data) to get some indication of the likely future changes in five-year outcomes.

While fewer students left study in 2012–13, more of them remained in New Zealand three years later

The number of students who left study in 2012–13 decreased to 37,515 from 38,937 in 2010–11. However, the proportion and the number who remained in New Zealand three years after study increased from 15,069 (39%) among the 2010–11 cohort to 16,293 (43%) among the 2012–13 cohort (Figure 28). Based on the behaviour of previous cohorts, it is likely that there will be some emigration of the 2012–13 former students from New Zealand between years three and five. However, the number and percentage of former students who leave New Zealand between years three and five has been trending down: 15% of the 2006–07 cohort who were still in New Zealand at year three had left by year five, 11% of the 2008–09 cohort, and 7% of the 2010–11 cohort.

Across cohorts, the proportion and number on a work visa at year three increased, and the proportion and number on a residence visa decreased after 2008–9 but increased again for the 2012–13 cohort (Figure 28). We expect that the number of 2012–13 former students on a work visa will drop considerably in year five, as most either leave New Zealand or transition to a residence visa (section 3, Figure 9).

Figure 28. Visa status, three years after leaving study, of international tertiary students who left study from 2006–07 to 2012–13, by cohort



Source: Migration spells dataset (MBIE).

Post-2013 cohorts are excluded because those migrants have not been in New Zealand for three years.

Later cohorts of Indian, South Korean and “other” nationality former students were more likely to stay in New Zealand

Later cohorts of Indian, South Korean and “other” nationality former students were more likely to be in New Zealand three years after leaving study compared with earlier cohorts from those countries. Later cohorts of Chinese former students were less likely to stay in New Zealand, and no change was detectable among former students from the USA (Figure 29). Among all nationalities, only Indian former students were more likely than not to be in New Zealand at year three (Figure 29).

All nationalities saw an increase in the proportion of former students on a work visa in later cohorts (Figure 29).

Figure 29. Visa status, three years after leaving study, of international tertiary students who left study from 2006–07 to 2012–13, by nationality and cohort

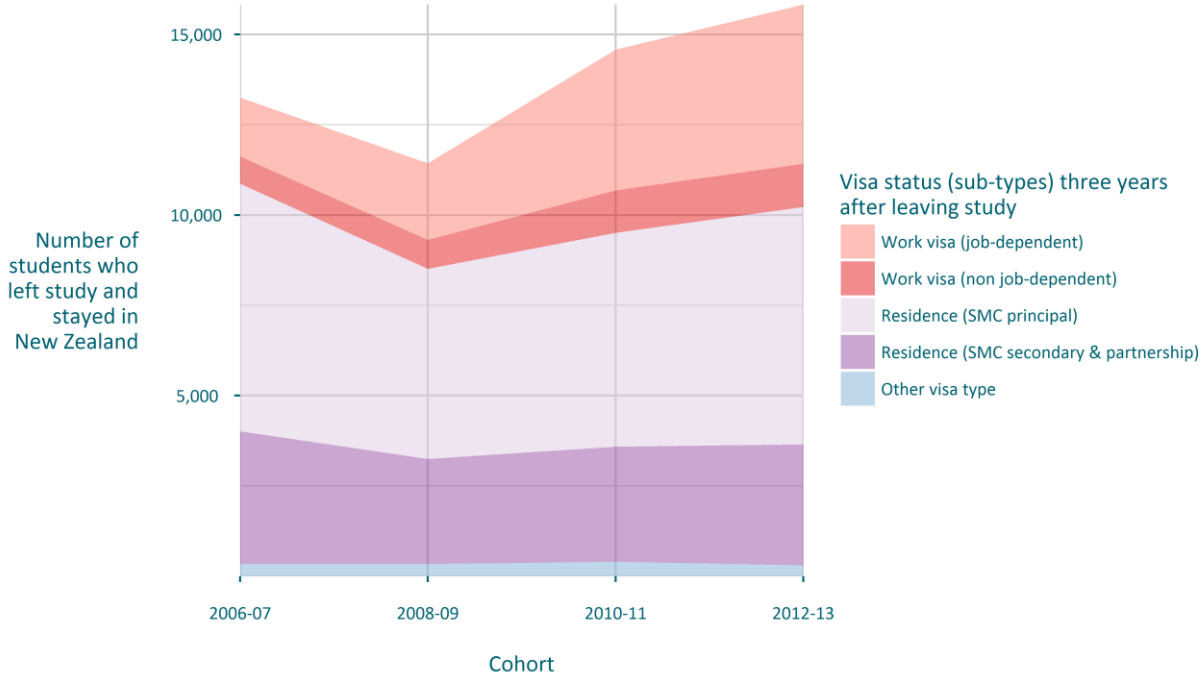
Source: Migration spells dataset (MBIE).

Post-2013 cohorts are excluded because those migrants have not been in New Zealand for three years.

Three-year visa sub-type outcomes are similar for the 2012–11 and 2012–13 cohorts, even though more 2012–13 former students have stayed in New Zealand

Among the students who were in New Zealand three years after leaving study, there was an increase in the proportion on job-dependent work visas (from 12% of the 2006–07 cohort to 28% of the 2012–13 cohort) and a decrease in the proportion on principal SMC, secondary SMC and Partnership residence visas (Figure 30). This is similar to the year five visa outcomes, in which we also see an increase across cohorts in the proportion on work visas and a decrease in the proportion on principal SMC visas (section 3, Figure 13). The three-year outcomes for the 2010–11 and 2012–13 cohorts were quite similar in terms of the proportions transitioning to different work and residence visa types, which suggests their proportionate outcomes at year five may also be quite similar, but with overall larger numbers staying in New Zealand from the 2012–13 cohort.

Figure 30. Visa sub-types three years after leaving study, of international tertiary students who left study from 2006–07 to 2012–13 and stayed in New Zealand, by cohort



Source: Migration Spells dataset (MBIE).

Note: Data is not shown for students with the visa statuses: “Out of New Zealand” or “Other/Missing data”.

For information about which visas are in each category, see Appendix 2, Visa sub-categories.

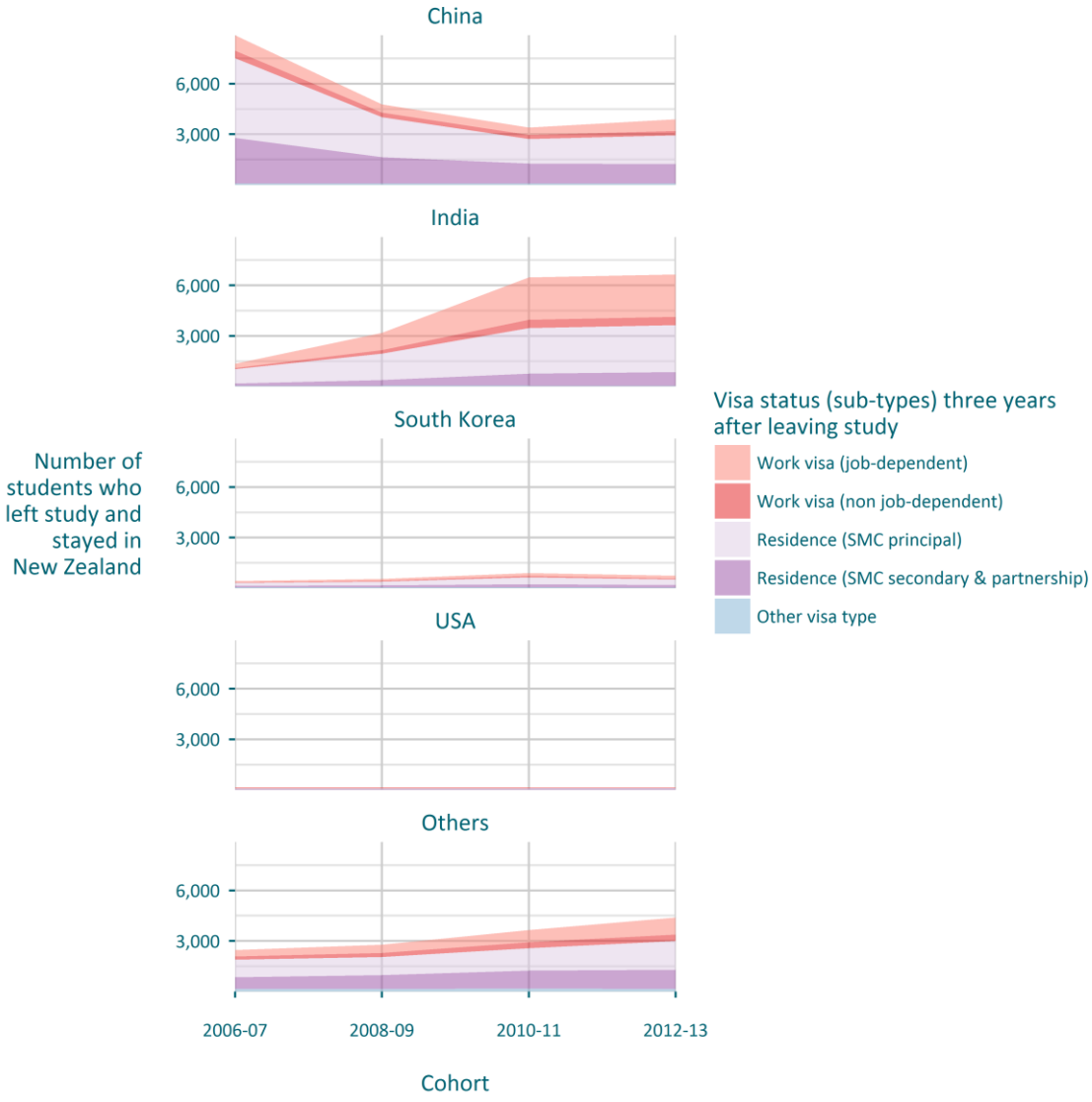
Post-2013 cohorts are excluded because those migrants have not been in New Zealand for three years.

Indian former students contributed the greatest increase in the number of former students on job-dependent work visas at year three

Most of the increase in the students on job-dependent work visas was among Indian former students, who across cohorts contributed a 10-fold increase in the numbers on work visas at year three, from 255 in 2006–07 to 2,517 in 2010–11 and 2,523 in 2012–13 (Figure 31).

Chinese and “other” nationality former students also saw an increase in the proportion on job-dependent work visas at year three, but because they did not have the large overall increase in numbers that we see for Indian former students, this has had less of an effect on the overall numbers on work visas (Figure 31).

Figure 31. Visa sub-types three years after leaving study, of international tertiary students who left study from 2006–07 to 2012–13 and stayed in New Zealand, by nationality and cohort



Source: Migration spells dataset (MBIE)

Note: Data is not shown for students with the visa statuses: “Out of New Zealand” or “Other/Missing data”.

For information about which visas are in each category, see Appendix 2, Visa sub-categories.

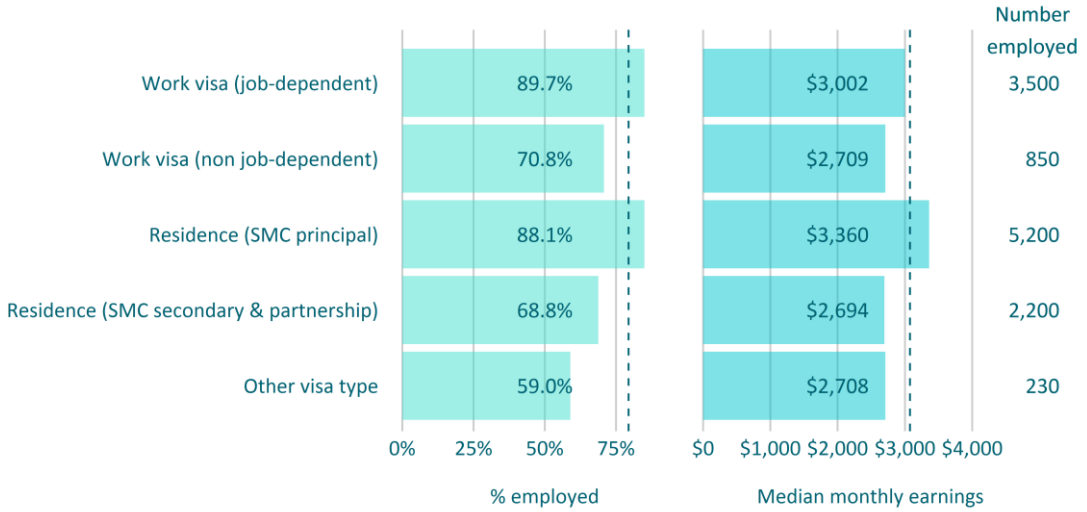
Post-2013 cohorts are excluded because those migrants have not been in New Zealand for three years.

Year three employment and earnings outcomes are similar across groups to year five

Comparisons between the employment and earnings outcomes of former students in the 2010–11 and 2012–13 cohorts suggest that the pattern of year five outcomes across nationalities and visa statuses (section 4) will remain roughly the same in future. That is, across both cohorts, year three employment rates and median earnings are highest among job-dependent work visa and principal SMC visa holders (Figures 32 and 33) and among former students of Indian and "other" nationalities (Figures 34 and 35). This is the same pattern that we see in year five (section 4).

Year three employment rates and median earnings are consistently higher among the 2012–13 cohort than the 2010–11 cohort (Figures 32 to 35). This is likely to relate, at least in part, to changing economic conditions.

Figure 32. By visa status, the proportion of international tertiary students who left study in 2010 and 2011 and were employed three years after leaving study (left panel) and their median monthly earnings (right panel)

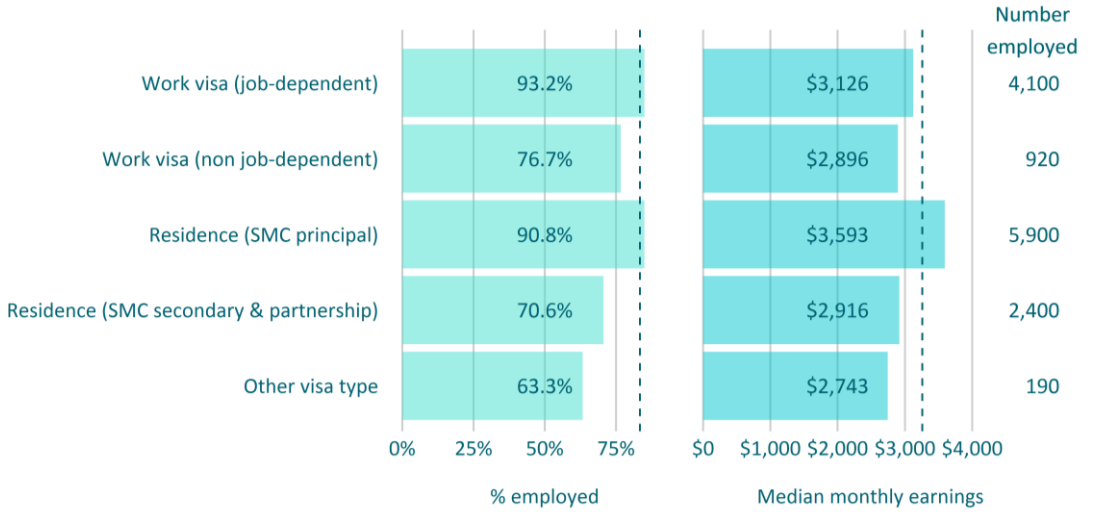


Source: Matched migration spells and tax data (IDI).

Note: Data is not shown for students with the visa statuses: "Out of New Zealand" or "Other/Missing data".

For information about which visas are in each category, see Appendix 2, Visa sub-categories.

Figure 33. By visa status, the proportion of international tertiary students who left study in 2012 and 2013 and were employed three years after leaving study (left panel) and their median monthly earnings (right panel)

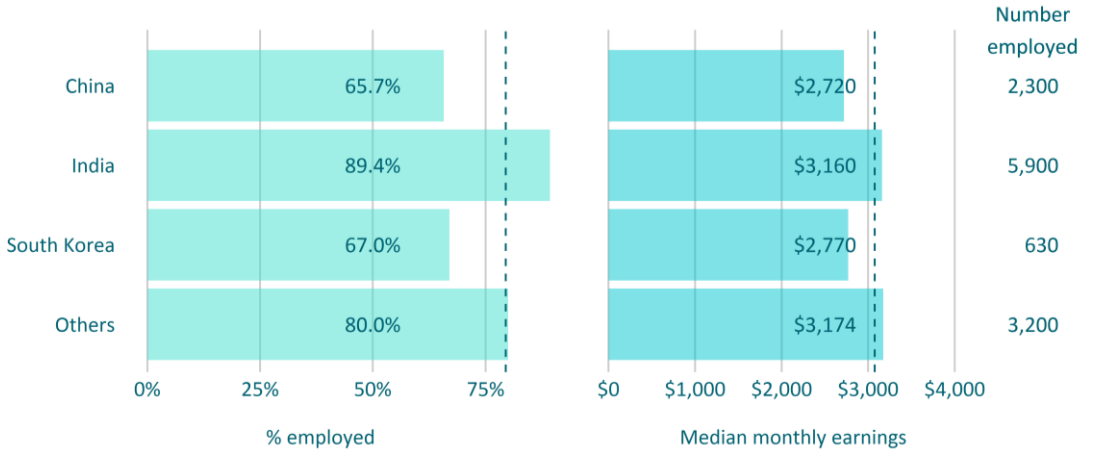


Source: Matched migration spells and tax data (IDI).

Note: Data is not shown for students with the visa statuses: “Out of New Zealand” or “Other/Missing data”.

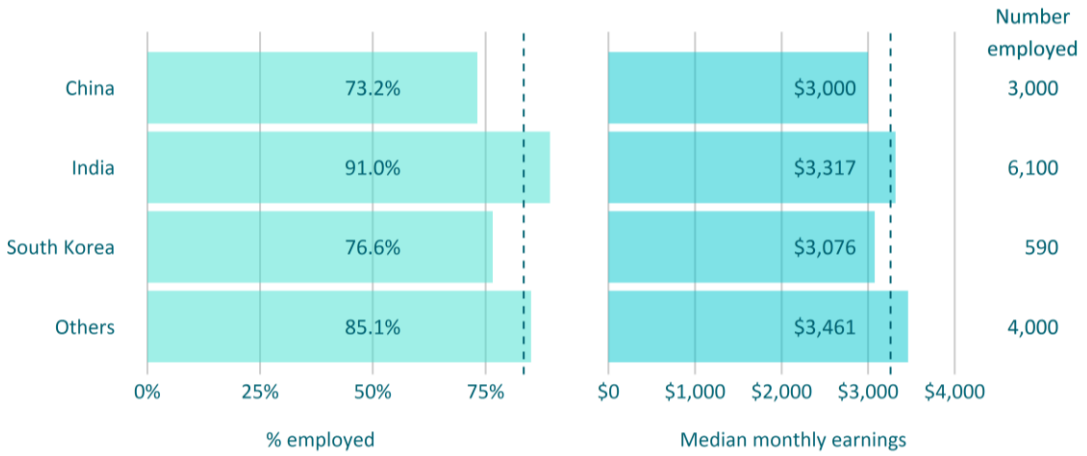
For information about which visas are in each category, see Appendix 2, Visa sub-categories.

Figure 34. By nationality, the proportion of international tertiary students who left study in 2010 and 2011 and were employed three years after leaving study (left panel) and their median monthly earnings (right panel)



Source: Matched migration spells and tax data (IDI).

Figure 35. By nationality, the proportion of international tertiary students who left study in 2012 and 2013 and were employed three years after leaving study (left panel) and their median monthly earnings (right panel)



Source: Matched migration spells and tax data (IDI).

Appendices

Appendix 1. Immigration policies

Information in this appendix is from the Immigration New Zealand *Operational Manual*.[11]

Student visa policy

The purpose of New Zealand's student visa is to contribute to New Zealand's sustainable economic development by:

- facilitating the entry of genuine students, with a focus on attracting and developing students who have the skills and talent New Zealand needs
- increasing global connectedness
- supporting the sustainable growth of export education capability
- earning foreign exchange
- strengthening New Zealand education, while managing risk to New Zealand and maintaining social cohesion.

Table A1 describes the main features of the student visa policy.

Table A1. Main features of the student visa policy

Policy	Main policy feature
Full fee paying	Students must meet the full cost of their courses. This category includes students studying at private institutions such as those offering English language courses.
Dependant of a worker	Dependent children of work visa holders may be issued with a student visa for the duration of the work visa.
English language studies	Student is enrolled on an English language course longer than 12 weeks.
Exchange student	Student studying under any of the reciprocal schemes approved by the Minister of Education.

Source: Ministry of Business, Innovation and Employment.

Residence visas

The objective of New Zealand's residence programme is to contribute to economic growth by enhancing the overall level of human capability in New Zealand, encouraging enterprise and innovation, and fostering international links, while maintaining a high level of social cohesion. This objective is achieved by selecting a broad mix of migrants on the basis of either their skills and experience or their family links to New Zealand.

[11] Immigration New Zealand. (2018). *Operational Manual.* Wellington: Ministry of Business Innovation and Employment. Retrieved on 20 February 2018 from: www.immigration.govt.nz/opsmanual/index.htm (last updated 20 January 2018).

The objective of the Skilled Migrant Category (SMC) is to provide for the grant of a residence visa to people who demonstrate that they:

- have skills to fill identified needs and opportunities in New Zealand
- are able to transfer those skills to New Zealand and link with local needs and opportunities
- are able to demonstrate an ability to contribute to New Zealand both economically and socially
- are able to demonstrate an ability to successfully settle in New Zealand.

In meeting this objective, the SMC, by focusing on a variety of source regions to achieve a balanced programme and linking global talent with local opportunities, will maximise and accelerate the contribution of immigration to New Zealand's:

- capacity building, sustainable growth and innovation
- global connectedness
- thriving and inclusive communities.

Under the SMC, bonus points are awarded for time spent studying in New Zealand towards a recognised qualification and for obtaining a recognised New Zealand qualification. The aim of this approach is to acknowledge that:

- time spent studying in New Zealand and completing a recognised qualification in New Zealand enhances settlement outcomes
- recognised qualifications gained in New Zealand will be recognised by, and are relevant to the needs of, New Zealand employers.

Until July 2011, qualifications from level 4 upwards were eligible for bonus points. From July 2011, only bachelor's degree or post-graduate qualifications were eligible for bonus points.

The Partnership Category contributes to the overall objective of the Family Categories by allowing the partners of New Zealand citizens and residence class visa holders to apply for a residence class visa so they can live with their partner in New Zealand. The objectives of the Family Categories are to:

- strengthen families and communities, while reinforcing the government's overall objectives in immigration instructions
- contribute to New Zealand's economic transformation and social development.

Work visas

The objective of New Zealand's work policies is to contribute to developing New Zealand's human capability base.

Work visas seek to achieve this objective by facilitating the access of New Zealand employers and New Zealand industries to global skills and knowledge, while:

- complementing the government's education, training, employment and economic development policies
- ensuring the employment in New Zealand of non–New Zealand citizens and residence class visa holders does not undermine the wages and conditions of New Zealand workers.

Study to work policies contribute to the overall work policy objective by facilitating and retaining access of New Zealand employers and industry to global skills and knowledge. This is achieved by providing a pathway to skilled employment and residence in New Zealand for highly skilled graduates and matching these workers to the needs of the economy. The visas under the Study to work policies are the Post-study work visa – open and the Post-study work visa – employer supported. They were formerly known as the graduate job search work visa and the graduate work experience work visa.

Visa changes affecting international students

Table A2 summarises the changes in visa policy that occurred between 2003 and 2017 and are likely to have affected international students.

Table A2. Visa changes affecting international students

Year	Skilled Migrant Category (SMC) residence visa changes	Post-study work visa changes	Other changes
2003	General Skills Category closed and Skilled Migrant Category introduced with points for qualifications: • levels 9 and 10: 55 points • levels 3 to 8: 50 points. New Zealand qualifications qualify for bonus points. A recognised New Zealand qualification gained after two years of study in New Zealand qualifies for 10 bonus points.		
2004	Additional bonus points added for: • qualifications, work experience and employment in areas of absolute skills shortage • having close family in New Zealand.		

Year	Skilled Migrant Category (SMC) residence visa changes	Post-study work visa changes	Other changes
2005	Expression of interest policy changes: • 140 points automatically selected • between 100 and 140 points with skilled job or offer ranked and selected • remainder selected with additional criteria set by the Minister.	Post-study work visas are introduced. The WD2 graduate job search visa allows people who have a New Zealand qualification that would **qualify for points under the SMC** to be granted a work visa/permit for up to **six months**. This can be granted only once. An employer-supported post-study work visa is also introduced: WD1 work on completion of study with an offer of employment. This allows people who have completed in New Zealand a course that has a minimum completion time of **three years** or a New Zealand qualification that would **qualify for points under SMC** and hold an offer of employment relevant to their course or qualification may be granted a work visa/permit for up to **two years** to obtain practical experience.	
2007	Policy changes to encourage students to stay and work: • bonus points for New Zealand work experience available after one year • identified future growth areas introduced • additional bonus points for New Zealand qualifications after a shorter period of study.	For WD2* category, as above, but permit extended to a maximum of **12 months**. For WD1* category, as above, but permit extended to a maximum period of **three years** if the applicant is working towards membership or registration with a New Zealand professional association that requires more than two years of practical work experience.	

Year	Skilled Migrant Category (SMC) residence visa changes	Post-study work visa changes	Other changes
2008	Minimum qualification level threshold raised. Only qualifications from level 4 qualify for SMC points.		
2010		Post-study work visas can now be granted more than once if a student has undertaken and completed a second higher New Zealand qualification at bachelor's or post-graduate degree level	
2011	SMC points lowered for qualifications below degree level and raised for postgraduate qualifications: • Levels 9 and 10: 60 points • Levels 7 and 8: 50 points • Levels 5 and 6: 40 points • Level 4: 40 points (but only for national certificates that are relevant to certain occupations).		

Year	Skilled Migrant Category (SMC) residence visa changes	Post-study work visa changes	Other changes
2012		The W2 graduate job search visa is renamed the W2 Post-study work visa and minimum study periods are introduced. Minimum study periods are introduced for the WD2. An applicant must have completed a qualification studied in New Zealand for at least: • one academic year at level 7 or above and at least; or • two academic years at level 4 to 6. Applicants could also complete two qualifications at levels 4 to 6 over two years provided the second qualification is at a higher level.	
2013			New Zealand Qualifications Authority Rule 18 changes allow private training establishments to undertake their own assessment of students' English language ability.
2015		One academic year is defined as 30 weeks.	New Zealand Qualifications Authority Rule 18 revised, leading to a larger proportion of students required to undertake recognised English tests.
2016	Automatic selection criteria raised to 160 points.		

Year	Skilled Migrant Category (SMC) residence visa changes	Post-study work visa changes	Other changes
2017	Extensive revision of the SMC, including the introduction of a minimum salary threshold for employment to be recognised as skilled.		Changes to the Essential Skills visa were implemented in August 2017, including the introduction of salary thresholds for employment skill levels to be assessed, a maximum duration of three years for lower-skilled Essential Skills visa holders and requiring the partners and children of lower-skilled Essential Skills visa holders to meet the requirements for a visa in their own right.

* The WD1 category of the Study to work visa is the Post-study work – employer assisted visa, while the WD2 category is the Post-study work visa – open.

Appendix 2. Datasets and definitions

Study population

This study defines international fee paying tertiary students who left study in the following way.

- International fee paying tertiary students were those who met all of the following criteria.
    - They held a student visa.
    - They were of non–New Zealand and non-Australian nationality.
    - They paid full fees. As an exception to this rule, foreign Doctor of Philosophy students were included, even though they pay domestic fees to study in New Zealand.
    - They were aged 18 years or older when they left study. This is a proxy measure used to exclude primary and secondary students from the population. It is consistent with previous Department of Labour work on international students.[12]
- Students were identified as having left study, if they met any of the following criteria, based on their last student visa.
    - Their student visa ended.
    - They transitioned from a student visa to a New Zealand work or residence visa.
    - They left New Zealand and did not return within six months of their departure date.

There are differences between this study's population and the population of international graduates who were followed in a recent Ministry of Education report on the destinations and earnings of international graduates.[13] The main differences are:

- The Ministry of Education report included only students who had completed a qualification. This report includes all people with international student visas, regardless of whether they completed their qualifications.
- The Ministry of Education report included only 'young' graduates, excluding students who were over a certain age, depending on the qualification that they did.
- The population in the Ministry of Education report was sourced from the Single Data Return (SDR), while the population in this study was sourced from the migration spells dataset. The spells dataset has more complete coverage of students attending private training establishments. These datasets are described in more detail below.

[12] A Wilkinson, P Merwood and A Masgoret. (2010). *Life After Study: International students' settlement experiences in New Zealand*. Wellington: Department of Labour. Retrieved on 20 February 2018 from: www.mbie.govt.nz/publications-research/research/migrants---settlement/life-after-study.pdf

[13] Z Park. (2016). *Moving Places: Destinations and earnings of international graduates*. Wellington: Ministry of Education. Retrieved on 20 February 2018 from: www.educationcounts.govt.nz/publications/80898/moving-places-destinations-and-earnings-of-international-graduates

The inclusion in this study of all international students, regardless of whether they completed a New Zealand qualification has implications for the interpretation of the results. Where qualifications confer points towards visa applications (Appendix 1), qualification completion is required, and our dataset contains an unknown proportion of students who studied in New Zealand without completing a qualification. These students would not have gained points towards visa applications.

Datasets

Migration spells dataset

The migration spells dataset contains visa approvals data from Immigration New Zealand matched with data on arrivals into and departures out of New Zealand. It captures a longitudinal view of migrants, tracing movements into and out of New Zealand, as well as visa changes over time.

Single Data Return (SDR)

The SDR consists of data collected by the Tertiary Education Commission and the Ministry of Education on tertiary student characteristics, enrolments and completions. It is described in the Single Data Return manual.[14]

The SDR covers all tertiary education organisations that receive government funding from the Student Achievement Component and/or have students with student loans or allowances or youth guarantee programmes.

Private training establishments (PTEs) that do not receive government funding are not required to provide SDR data, so the migration spells dataset includes international students who are not in the SDR because they are attending non-funded PTEs. This may make a substantial difference. Export education levy data for 2005 to 2012 suggests that international students at non-SDR PTEs comprised 79% of the international students at PTEs and 46% of the total population of international tertiary students.[15] Our data on match rates between the SDR and migration spells also suggests this is an issue, but that the proportion of students who attended non-SDR PTEs may be slightly lower, at around 54% (Table A2.3).

Inland Revenue tax data

Inland Revenue tax data was used to determine labour market outcomes. Among other things, this dataset contains information on employment status and earnings. It is described in the Integrated Data Infrastructure (IDI) data dictionary for the Inland Revenue tax data. [16]

[14] Ministry of Education. (2016). *2016 Single Data Return: A manual for tertiary education organisations and student management system developers.* Wellington: Ministry of Education. Retrieved on 28 October 2016 from: www.steo.govt.nz/assets/Uploads/Single-Data-Return-Manual-2016-ver-1.0.pdf

[15] 2015 Export Education Levy Full-Year Statistics. (2015). *Education Counts.* Retrieved on 28 October 2016 from: www.educationcounts.govt.nz/statistics/international-education/international-students-in-new-zealand

[16] Statistics New Zealand. (2015). *IDI Data Dictionary: IR tax data* (September 2015 edition). Retrieved on 28 October 2016 from: www.stats.govt.nz/browse_for_stats/snapshots-of-nz/integrated-data-infrastructure/idi-data/irtax-data.aspx

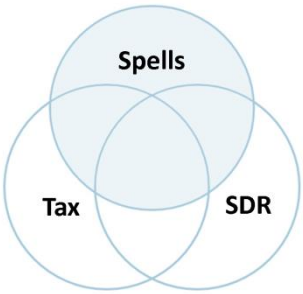
Matching between datasets

Migration spells dataset

The migration spells dataset (without matching to any other dataset) was used for analysis of outcomes by nationality and institution (Table A2.1).

Table A2.1. Number of students by cohort in the migration spells dataset

Cohort	No. of students who left study
2006–07	35,010
2008–09	33,021
2010–11	38,934
2012–13	37,512
2014–15	42,756



Matched migration spells and Single Data Return data

Matched migration spells and SDR data was used to analyse outcomes by level and field of study (Table A2.2).

Table A2.2. Number of students by cohort, in the matched Spells-SDR dataset

Cohort	No. students who left study	Match rate*
2006–07	27,096	77%
2008–09	23,727	72%
2010–11	25,683	66%
2012–13	25,332	68%
2014–15	28,719	67%

* As a percentage of the number of students in the migration spells dataset.

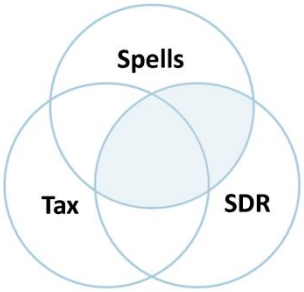
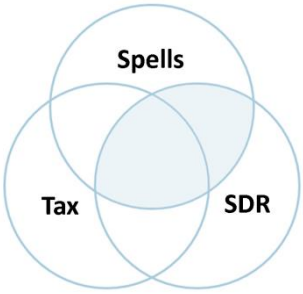


Table A2.3. Number of students by institution type in the matched migration spells–SDR dataset

Institution type	No. students who left study 2006–15	Match rate*
Private training establishments	8,373	43%
Universities	70,797	87%
Institutes of technology and polytechnics	26,574	89%
Other/missing	300	84%

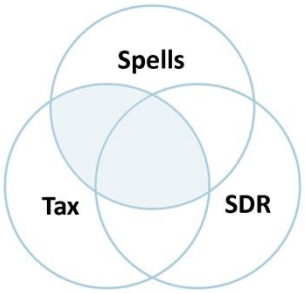
* As a percentage of the number of students in the migration spells dataset.



Match rates are considerably lower for PTE students than for students who attended universities or institutes of technology and polytechnics (ITPs). If a 12% loss due to incomplete matching is assumed (based on the university and ITP match rates), the loss of PTE students over and above that is 45% (100% - 43% - 12% = 45%), suggesting that around 45% of the PTE students may have attended non-SDR PTEs.

Matched migration spells and tax data

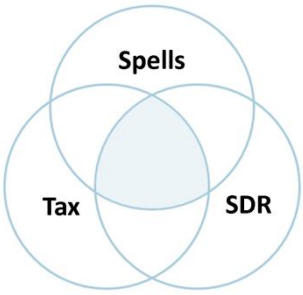
Matched migration spells and tax data was used to analyse labour market outcomes by nationality and institution.



The tax dataset does not include people who do not receive taxable income, so it is not possible to calculate match rates between the spells and the tax datasets without limiting the population to only those with taxable income.

Matched migration spells, SDR and tax data

Matched migration spells and tax data was used to analyse labour market outcomes by level and field of study.



The tax dataset does not include people who do not receive taxable income, so it is not possible to calculate match rates between the spells–SDR and the tax datasets without limiting the population to only those with taxable income.

Measurement of immigration and labour force outcomes

Years one, three and five

Outcomes were measured at one, three and five years after leaving study. For each former student, these time points were calculated relative to the day that they left study.

Broad visa status

The analysis of visa outcomes categorised students into four groups.

- Out of New Zealand: former students who had left study and were not in New Zealand at the time point and who had not been in New Zealand for at least six months before that point.
- Work visa: former students who had left study and who held a work visa at the time point, and who were either in New Zealand at that point or had left New Zealand but had been gone for less than six months.
- Residence visa: former students who had left study and who held a residence visa at the time point, and who were either in New Zealand at that point or had left New Zealand but had been gone for less than six months.
- Other: students who had left study and who, at the time point, were not recorded as holding a work or residence visa or as having departed New Zealand for at least six months. This could include unlawful migrants or people for whom data on visa status or departure from New Zealand was missing.

Visa sub-categories

For some analyses, work and residence visas were further broken down into sub-categories:

- work visa (job-dependent):
    - Long-Term Business visa principal applicant
    - Entrepreneur principal applicant
    - Study to work visa
    - Essential Skills work visa
    - Recognised Seasonal Employer work visa
    - Work to residence visa
- work visa (non–job-dependent):
    - Long-Term Business visa secondary applicant
    - Entrepreneur secondary applicant
    - Partner of a worker work visa
    - Working holiday scheme visa
    - other and unknown work visas
- Residence (SMC principal): Skilled Migrant Category principal applicant
- Residence (SMC secondary and Partnership):
    - Skilled Migrant Category secondary applicant
    - Partner of a New Zealander resident visa holder
- Other visa types: This category includes all other residence visas that don't fall into one of the above categories. Although many visas could be in this category, the main ones are Family Category other than Partnership (Parent, Sibling, Dependent Child), the Entrepreneur Category and the Talent – Accredited Employer Category.

Further detail on visa types is in Immigration New Zealand's *Operational Manual*.[17]

Labour market outcomes

The following labour market outcomes were examined at one, three and five years post-study, and were derived from the Inland Revenue tax data:

- employment status (former students were counted as employed if they were earning wages or salary; note that this excludes self-employed students)
- region of employment
- industry of employment
- earnings of employed students (median monthly earnings for the year).

Measurement of student and study characteristics

Cohorts

This analysis tracked cohorts of former students, following their pathways after leaving study for up to five years. The two-year cohort groups tracked were the:

[17] Immigration New Zealand. (2016). *Operational Manual*. Retrieved on 22 November 2016 from: http://onlineservices.immigration.govt.nz/opsmanual/index.htm

- 2006–07 cohort: students who left study in the calendar years 2006 and 2007
- 2008–09 cohort: students who left study in the calendar years 2008 and 2009
- 2010–11 cohort: students who left study in the calendar years 2010 and 2011
- 2012–13 cohort: students who left study in the calendar years 2012 and 2013
- 2014–15 cohort: students who left study in the calendar years 2013 and 2014.

The 2006–07, 2008–09 and 2010–11 cohorts were tracked for five years, with outcomes are reported at one year, three years and five years after leaving study. Because the data for this study was extracted in December 2017, the full five years of tracking could not be completed for the 2012–13 cohort, so that cohort's outcomes are reported at only one year and three years after leaving study.

Nationalities

Student nationality was determined from visa data in the migration spells dataset. Analysis by nationality used five categories:

- China (29% of students who left in 2006–15)
- India (21% of students who left in 2006–15)
- USA (10% of students who left in 2006–15)
- South Korea (7% of students who left in 2006–15)
- Other (34% of students who left in 2006–15).

Institution

Analysis by the type of tertiary institution used the following categories obtained from the migration spells data:

- universities
- PTEs
- institutes of technology and polytechnics
- Other/Missing.

Because the SDR dataset (which was used to determine level and field of study) does not provide good coverage of non–government-funded PTEs, students who attended PTEs are under-represented in the analyses by level and field of study.

Level of study

Analysis by level of study uses the following categories from the New Zealand Qualifications Framework:[18]

- non-formal and level 1–3 certificates
- sub-degree certificates and diplomas (level 4 certificates and level 5–7 diplomas and certificates)
- bachelor's degree
- post-degree certificates, diplomas and honours (level 7 and 8 graduate and postgraduate certificates, diplomas and honours degrees)

[18] New Zealand Qualifications Authority. (2016). *The New Zealand Qualifications Framework.* Retrieved on 28 October 2016 from: www.nzqa.govt.nz/assets/Studying-in-NZ/New-Zealand-Qualification-Framework/requirements-nzqf.pdf

- master's degrees and doctorates.

These groupings were chosen because they correspond as closely as possible to the changes made during this period to the visa eligibility requirements covering level of study (Appendix 1).

Field of study

Analysis by field of study uses the New Zealand Standard Classification of Education (NZSCED) broad fields of study,[19] with a further grouping of the less popular fields and fields of less policy interest into an 'other fields' category. Analysis by field of study used the following categories:

- engineering and science (combines NZSCED natural and physical sciences, and engineering and related technologies) (12% of students who left in 2006–15)
- food, hospitality and personal services (7% of students who left in 2006–15)
- information technology (7% of students who left in 2006–15)
- management and commerce (35% of students who left in 2006–15)
- society and culture (20% of students who left in 2006–15)
- Other fields (combines NZSCED architecture and building, agriculture, environmental and related studies, health, education, creative arts, and mixed field programmes) (19% of students who left in 2006–15).

[19] NZSCED Broad Fields of Study. (2016). *Education Counts.* Retrieved on 28 October 2016 from: www.educationcounts.govt.nz/data-services/collecting-information/code-sets-and-classifications/new_zealand_standard_classification_of_education_nzsced/nzsced_broad_fields_of_study

Appendix 3. Statistical modelling of visa outcomes

Introduction

We used multinomial logistic regression to determine which factors (out of cohort, nationality, institution, level of study and field of study) were the best predictors of students' visa statuses five years after leaving study. The dependent variable was the proportion of students with each visa status (out of New Zealand, work visa, residence visa, other/missing) five years after leaving study.

The modelling was carried out on migration spells data (which includes information on cohort, nationality and institution), and separately on matched spells and Single Data Return (SDR) data (which includes information on cohort, nationality, institution, field and level of study, but omits many students who attended private training establishments (PTEs) (Appendix 2).

Spells data on visa outcomes by cohort, nationality and institution

We used multinomial logistic regression to analyse associations between cohort, nationality, institution and the probabilities of the four different visa outcomes. It is important to note that this relates to the **proportion** of students with each outcome, not the absolute number. For example, this analysis can assess whether different cohorts are associated with a higher or lower proportion of students leaving New Zealand, but it does not assess the overall increase in student numbers across cohorts.

Fitting the saturated model (with all of the predictors and all of the interactions between them) showed that cohort, nationality, institution and all of the interactions were significant.

Analysis of deviance table (type II tests)

Model: visa ~ nationality x cohort x institution
Akaike information criterion (AIC) 149115.7

Predictor/interaction term	Likelihood ratio Chi square	Degrees of freedom	Probability (> Chisq)
Nationality	11156.1	12	< 2.2e-16
Cohort	182.6	6	< 2.2e-16
Institution	1354.2	9	< 2.2e-16
Nationality x cohort	332.4	24	< 2.2e-16
Nationality x institution	370.6	36	< 2.2e-16
Cohort x institution	284.6	18	< 2.2e-16
Nationality x cohort x institution	147.7	72	3.75E-07

The analysis was then re-run, removing one interaction term or one predictor each time. The difference in the fit of each model was assessed using deviance and AIC values (a smaller deviance and AIC indicate a better fitting model). The table below shows that the greatest increase in the deviance and AIC resulted from the removal of nationality.

Effects of removing predictors on the model's fit, as judged by the deviance and AIC

Predictor/interaction term removed	Deviance	Deviance difference	AIC	AIC difference
None (saturated model)	148761.7	0.0	149115.7	0.0
Cohort x nationality x institution	148908.3	146.6	149124.3	8.6
Cohort x institution	149194	432.3	149374.0	258.3
Nationality x institution	149280.0	518.3	149424.0	308.3
Nationality x cohort	149241.7	480.0	149409.7	294.0
Cohort	149746.0	984.3	149866.0	750.3
Institution	151011.8	2250.1	151101.8	1986.1
Nationality	160802.3	12040.6	160874.3	11758.6

Finding: Based on the migration spells data, among cohort, nationality and institution, nationality is the most important predictor of five-year visa outcomes, but all three are significant and there are interactions between them.

Migration Spells– Single Data Return data on visa outcomes by cohort, nationality, institution, field and level of study

Two saturated models, each with four predictors, and the base model with all five predictors were fitted to the migration spells–SDR matched data. Results are shown in the three tables below. This modelling showed that all five predictors are significant and that there are significant interactions between them.

Analysis of deviance tables (type II tests)

Model: visa ~ nationality x cohort x institution x field
AIC: 97641.23

Predictor/interaction term	Likelihood ratio Chi square	Degrees of freedom	Probability (>Chisq)
Nationality	5343.1	12	< 2.2e-16
Cohort	1.3	6	0.969897
Institution	532.2	9	< 2.2e-16
Field	2000.3	15	< 2.2e-16
Nationality x cohort	34.9	24	0.069323
Nationality x institution	17.0	36	0.997052
Nationality x field	43.5	60	0.946456
Cohort x institution	-224.6	18	1
Cohort x field	-127.3	30	1
Institution x field	-210.3	45	1
Nationality x cohort x institution	169.2	72	8.55E-10
Nationality x cohort x field	-68.3	120	1
Nationality x institution x field	487.7	180	< 2.2e-16
Cohort x institution x field	129.0	90	0.004422
Nationality x cohort x institution x field	1421.8	360	< 2.2e-16

Model: visa ~ nationality x cohort x institution x level
AIC: 99044.88

Predictor/interaction term	Likelihood ratio Chi square	Degrees of freedom	Probability (>Chisq)
Nationality	6913.6	12	< 2.2e-16
Cohort	113.2	6	< 2.2e-16
Institution	410.1	9	< 2.2e-16
Level	834.8	12	< 2.2e-16
Nationality x cohort	88.0	24	3.07E-09
Nationality x institution	184.0	36	< 2.2e-16
Nationality x level	407.5	48	< 2.2e-16
Cohort x institution	104.7	18	3.04E-14
Cohort x level	59.6	24	7.31E-05
Institution x level	155.3	36	< 2.2e-16
Nationality x cohort x institution	91.3	72	0.06241
Nationality x cohort x level	102.4	96	0.30823
Nationality x institution x level	152.6	144	0.29518
Cohort x institution x level	99.0	72	0.01925
Nationality x cohort x institution x level	331.1	288	0.04076

Model: visa ~ nationality + cohort + institution + field + level
AIC: 97809.26

Predictor/interaction term	Likelihood ratio Chi square	Degrees of freedom	Probability (>Chisq)
Nationality	5172.2	12	< 2.2e-16
Cohort	177.6	6	< 2.2e-16
Institution	317.8	9	< 2.2e-16
Field	1967.1	15	< 2.2e-16
Level	707.9	12	< 2.2e-16

The analysis was then re-run on the base model removing one predictor each time. The difference in the fit of each model was assessed using deviance and AIC values (a smaller deviance and AIC indicate a better fitting model). The table below shows that the greatest increase in the deviance and AIC resulted from the removal of nationality and field of study.

Effects of removing predictors on the model's fit, as judged by the deviance and AIC

Predictor/interaction term removed	Deviance	Deviance difference	AIC	AIC difference
None (base model)	97695.3	0.0	97809.3	0.0
Nationality	102867.4	5172.1	102957.4	5148.1
Cohort	97872.9	177.6	97974.9	165.6
Institution	98013.1	317.8	98109.1	299.8
Field	99662.3	1967	99746.3	1937
Level	98403.2	707.9	98493.2	683.9

Finding: Among cohort, nationality, institution, level and field of study, nationality and field of study are the most important predictors of five-year visa outcomes, but all five are significant, and there are interactions between them.

Assumptions

Multinomial logistic regression relies on the assumption of independence of irrelevant alternatives. This assumption states that the odds of preferring one class over another do not depend on the presence or absence of other "irrelevant alternatives". For example, the odds of choosing a work visa as compared with leaving New Zealand would not change if another type of visa was added. This seems reasonable to assume, but is difficult to test in cases such as this where the saturated model is used. Therefore, it should be noted that these results cannot be used to predict what would happen if a new visa type were made available.

Multinomial logistic regression does not require the predictors to be statistically independent, but it does assume that collinearity is relatively low. Estimating the variance inflation factors (VIFs) after fitting a linear regression model to each of the datasets showed only low to moderate collinearity between the selected predictors.

Conclusion

Taken together, the findings suggest that nationality and field of study are the predictors that have the greatest effects on model fit. Therefore, out of the five predictors examined, nationality and field of study contribute the most to predicting the visa choices that students make.

However, all of the predictors are statistically significant, and there are significant interactions between them. The presence of interactions means the results associated with one predictor vary according to the levels of another. For example, later cohorts may be associated with greater numbers of students going on to a work visa for one nationality, but fewer students going on to a work visa for another nationality.

Appendix 4. Statistical modelling of employment outcomes

Introduction

We used binomial logistic regression to determine which factors (out of cohort, nationality, institution, level of study and field of study) were the best predictors of whether a student was employed or not five years after leaving study.

The modelling was carried out on migration spells–tax matched data (which includes information on cohort, nationality and institution) and separately on matched spells–Single Data Return (SDR)–tax data (which includes information on cohort, nationality, institution, field and level of study, but omits many students who attended private training establishments (Appendix 2).

Migration spells–tax matched data on employment outcomes by cohort, nationality and institution

We used binomial logistic regression to analyse associations between cohort, nationality, institution, and the probability of a student being employed five years after leaving study.

Fitting the saturated model (with all of the predictors and all of the interactions between them) showed that cohort, nationality, institution and all of the interactions were significant, although the three-way interaction was significant only at the 10% level.

Analysis of deviance table (type II tests)

Model: employment ~ nationality x cohort x institution
Akaike information criterion (AIC): 38750.33

Predictor/interaction term	Likelihood ratio Chi square	Degrees of freedom	Probability (>Chisq)
Nationality	1618.86	4	< 2.2e-16
Cohort	38.77	2	3.81E-09
Institution	311.28	3	< 2.2e-16
Nationality x cohort	30.01	8	0.000211
Nationality x institution	47.58	12	3.70E-06
Cohort x institution	26.96	6	0.000148
Nationality x cohort x institution	34.44	20	0.023308

The analysis was then re-run, removing one interaction term or one predictor each time. The difference in the fit of each model was assessed using deviance and AIC values (a smaller deviance and AIC indicate a better fitting model). The table below shows that the greatest increase in the deviance and AIC resulted from the removal of nationality.

Effects of removing predictors on the model's fit, as judged by the deviance and AIC

Predictor/interaction term removed	Deviance	deviance difference	AIC	AIC difference
None (saturated model)	38638.3	0.0	38750.3	0
Cohort x nationality x institution	38672.8	34.5	38744.8	-5.5
Cohort x institution	38699.7	61.4	38759.7	9.4
Nationality x institution	38720.3	82.0	38768.3	18
Nationality x cohort	38702.8	64.5	38758.8	8.5
Cohort	38767.3	129.0	38807.3	57
institution	38767.3	129.0	38807.3	57
nationality	40378.4	1740.1	40402.4	1652.1

Finding: Based on migration spells data, among cohort, nationality and institution, nationality is the most important predictor of five-year employment outcomes, but all three are significant, and there are interactions between them.

Migration spells–SDR–tax data on employment outcomes by cohort, nationality, institution, field and level of study

The base model with all five predictors, and a saturated model restricted to the 2010–11 cohort were fitted to the migration spells–SDR–tax matched data. Results are shown in the two tables below. This modelling showed that all five predictors and most of the interactions between them are significant.

Analysis of deviance tables (type II tests)

Model: employment ~ nationality + cohort + institution + field + level
Data: Migrations spells–SDR–tax data on all three cohorts
AIC: 26627.8

Predictor/interaction term	Likelihood ratio Chi square	Degrees of freedom	Probability (>Chisq)
Nationality	957.16	4	< 2.2e-16
Cohort	19.82	2	4.96E-05
Institution	60.24	2	8.28E-14
Field	57.12	5	4.77E-11
Level	52.21	4	1.25E-10

Model: employment ~ nationality x institution x field x level
Data: Migration spells–SDR–tax data on the 2010–11 cohort only
AIC: 193075.2

Predictor/interaction term	Likelihood ratio Chi square	Degrees of freedom	Probability (>Chisq)
Nationality	10164.3	4	< 2.2e-16
Institution	9803.9	2	< 2.2e-16
Field	30.4	5	1.243E-05
Level	8290.0	4	< 2.2e-16
Nationality x institution	28762.8	8	< 2.2e-16
Nationality x field	-15859.2	20	1
Nationality x level	2811.4	16	< 2.2e-16
Institution x field	14345.4	10	< 2.2e-16
Institution x level	-9876.0	8	1
Field x level	22202.9	18	< 2.2e-16
Nationality x institution x field	21193.7	28	< 2.2e-16
Nationality x institution x Level	360.4	23	< 2.2e-16
Nationality x field x level	6559.9	50	< 2.2e-16
Institution x field x level	-19896.1	26	1
Nationality x institution x field x level	5478.6	36	< 2.2e-16

The analysis was then re-run on the base model (using data on all three cohorts) removing one predictor each time. The difference in the fit of each model was assessed using deviance and AIC values (a smaller deviance and AIC indicate a better fitting model). The table below shows that the greatest increase in the deviance and AIC resulted from the removal of nationality.

Effects of removing predictors on the model's fit, as judged by the deviance and AIC

Predictor/interaction term removed	Deviance	Deviance difference	AIC	AIC difference
None (base model, all three cohorts)	26684.8	0.0	26722.8	0
Nationality	27650.1	965.3	27680.1	957.3
Cohort	26704.4	19.6	26738.4	15.6
Institution	26745.2	60.4	26777.2	54.4
Field	26743.4	58.6	26771.4	48.6
Level	26738.7	53.9	26768.7	45.9

Finding: Among cohort, nationality, institution, level of study and field of study, nationality is the most important predictor of five-year visa outcomes, but all five predictors are significant, and there are significant interactions between them.

Assumptions

Logistic regression requires that there is little or no multicollinearity between the predictors. Estimating the variance inflation factors (VIFs) after fitting a linear regression model to each of the datasets showed that collinearity was low.

Conclusion

Taken together, the findings suggest that nationality is the predictor that has the greatest effect on model fit. Therefore, out of the five predictors examined, nationality contributes the most to predicting former students' employment status five years after leaving study.

However, all of the predictors are statistically significant, and there are significant interactions between them. The presence of interactions means the results associated with one predictor vary according to the levels of another. For example, higher levels of study may be associated with higher employment rates for one nationality and lower employment rates for another nationality.

Appendix 5. Statistical modelling of earnings outcomes

We used factorial analysis of variance (ANOVA) to determine which factors (out of cohort, nationality, institution, level of study and field of study) were the best predictors of former students' earnings five years after leaving study.

The modelling was carried out on migration spells–tax matched data (which includes information on cohort, nationality and institution), and separately on matched spells– single Data Return (SDR)–tax data (which includes information on cohort, nationality, institution, field of study and level of study, but omits many students who attended private training establishments (Appendix 2).

Migration spells–tax data on earnings by nationality and institution

We used factorial ANOVA to analyse associations between nationality and institution, and students' earnings five years after leaving study.[20] The dataset was restricted to employed students in the 2010–11 cohort.

Fitting the saturated model (with both predictors and the interaction between them) showed that both nationality and institution were significant predictors and that the interaction between them was significant.

ANOVA table (type II tests)

Model: earnings ~ nationality x institution
Data: Migration spells–tax data on the employed students from the 2010–11 cohort
Akaike information criterion (AIC): 13321.47

Predictor/interaction term	F-value	Probability (>Chisq)
Nationality	127.2807	< 2.2e-16
Institution	170.8072	< 2.2e-16
Nationality x institution	3.0506	0.0007164

The analysis was then re-run, removing one interaction term or one predictor each time. The difference in the fit of each model was assessed using adjusted R-squared (R^2) and AIC values (a smaller AIC indicates a better fitting model, while a larger adjusted R^2 indicates that the model explains more of the variation in earnings). The table below shows that the greatest increase the AIC and decrease in the adjusted R^2 resulted from the removal of institution or nationality. Neither predictor was clearly more important than the other.

[20] The earnings variable was the log transform of each student's median monthly earnings during their fifth year after leaving study.

Effects of removing predictors on the model's fit, as judged by the adjusted R^2 and AIC

Predictor/interaction term removed	Adjusted R^2	Adjusted R^2 difference	AIC	AIC difference
None (saturated model)	0.0798	0.0000	13321.5	0.0
Nationality x institution	0.0780	0.0018	13332.0	10.5
Institution	0.0337	0.0461	13825.8	504.3
Nationality	0.0341	0.0457	13820.7	499.2

Finding: Based on migration spells data, both nationality and institution are important predictors of former students' earnings five years after leaving study. The interaction between nationality and institution is significant too.

Migration spells–Single Data Return–tax data on earnings by nationality, institution, field of study and level of study

A saturated model restricted to employed students in the 2010–11 cohort was fitted to the migration spells–SDR–tax matched data. Results are shown in the table below. This modelling showed that all four predictors, and the interactions between them, are significant.

ANOVA table (type II tests)

Model: earnings ~ nationality x institution x field x level
Data: Migration spells–SDR–tax data on the employed students from the 2010–11 cohort
AIC: 7940.954

Predictor/interaction term	F-value	Probability (>Chisq)
Nationality	50.4826	< 2.2e-16
Institution	20.7635	2.21E-13
Field	39.9111	< 2.2e-16
Level	25.2487	< 2.2e-16
Nationality x institution	4.6483	3.70E-06
Nationality x field	2.8135	4.22E-05
Nationality x level	2.8528	0.0001151
Institution x field	4.2073	7.63E-06
Institution x level	1.8406	0.0649465
Field x level	4.8699	4.65E-11
Nationality x institution x field	1.3723	0.0760708
Nationality x institution x level	2.8126	1.26E-05

Predictor/interaction term	F-value	Probability (>Chisq)
Nationality x field x level	2.5752	4.48E-08
Institution x field x level	2.3184	0.0002087
Nationality x institution x field x level	3.1206	8.13E-09

The analysis was then re-run, removing one interaction term or one predictor each time. The difference in the fit of each model was assessed using adjusted R^2 and AIC values (a smaller AIC indicates a better fitting model, while a larger adjusted R^2 indicates that the model explains more of the variation in earnings). The table below shows that the greatest increase the AIC and decrease in the adjusted R^2 resulted from the removal of either nationality or field of study, closely followed by level of study, and then institution. However, unlike the modelling of visa and employment status, none of the predictors stood out as clearly more important for model fit than the others.

Effects of removing predictors on the model's fit, as judged by the deviance and AIC

Predictor/interaction term removed	Adjusted R^2	Adjusted R^2 difference	AIC	AIC difference
None (saturated model)	0.1821	0.0000	7941.0	0.0
Nationality x institution x field x level	0.1733	0.0088	7980.1	39.1
Institution x field x level	0.1691	0.0130	7989.2	48.2
Nationality x field x level	0.1642	0.0179	8007.7	66.7
Nationality x institution x level	0.1685	0.0136	7997.5	56.5
Nationality x institution x field	0.1733	0.0088	7953.7	12.7
Field x level	0.1515	0.0306	8063.9	122.9
Institution x level	0.1630	0.0191	8008.0	67.0
Institution x field	0.1646	0.0175	7988.3	47.3
Nationality x level	0.1554	0.0267	8038.4	97.4
Nationality x field	0.1586	0.0235	8002.9	61.9
Nationality x institution	0.1641	0.0180	7996.4	55.4
Nationality	0.0949	0.0872	8363.8	422.8
Institution	0.1174	0.0647	8201.2	260.2
Field	0.0958	0.0863	8356.1	415.1
Level	0.112	0.0701	8239.4	298.4

Finding: There is little to choose between nationality, institution, level of study and field of study as predictors of earnings. All are significant and have significant interactions between them.

Assumptions

ANOVA requires little or no multicollinearity between the predictors. Estimating the variance inflation factors (VIFs) of the fitted models showed that collinearity was low.

ANOVA also requires that the dependent variable (earnings) approximates a multivariate normal distribution and that there is homogeneity of variance across the groups that are being compared. Residual versus fitted value and quantile–quantile (Q–Q) plots showed some departure from normality, with skew in the log-transformed earnings variable. However, the departure from normality was not too severe, and ANOVA is relatively robust to departures from normality. A Levene's test suggested that there was not homogeneity of variance, but with this large dataset, even small differences between groups can cause a failure of the Levene's test.

While the data does not entirely satisfy the assumptions of an ANOVA, it is likely to be sufficient for this analysis. We are attempting to get only an indication of how important the different predictors are; we are not trying to generate predicted values for different types of students (which would require greater precision in the model). The modelling suggests that all of the predictors are important (and none are only marginally significant), so any issues with the model are unlikely to change this finding.

Conclusion

Taken together, the findings suggest that nationality, institution, level of study and field of study are all important predictors of former students' earnings and that there are significant interactions between them.

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