

2010



IMMIGRANT SELECTION AND THE RETURNS TO HUMAN CAPITAL IN NEW ZEALAND AND AUSTRALIA



Steven Stillman

Motu Economic and Public Policy Research and University of Waikato

Malathi Velamuri

Victoria University of Wellington

Disclaimer: The Department of Labour has made every effort to ensure that the information contained in this report is reliable, but makes no guarantee of its accuracy or completeness and does not accept any liability for any errors. The Department may change the contents of this report at any time without notice.

© Crown copyright 2010

This material is Crown copyright unless otherwise stated and may be reproduced free of charge without requiring specific permission. This is subject to it being reproduced accurately and not being used in a derogatory manner or in a misleading context. The source and copyright status should be acknowledged. The permission to reproduce Crown copyright protected material does not extend to any material in this report that is identified as being the copyright of a third party.

Department of Labour

PO Box 3705

Wellington

New Zealand

www.dol.govt.nz

For Immigration Research visit

www.immigration.govt.nz/research

ISBN 978-0-478-36054-7

CONTENTS

Acknowledgements	v
Glossary	vii
Executive summary	ix
1 Introduction	1
2 Background	2
3 Data	3
3.1 New Zealand Income Survey and Household, Income and Labour Dynamics in Australia survey	3
3.2 Defining country of birth	3
3.3 Defining the analysis sample	4
3.4 Measuring human capital.....	6
3.5 Measuring wages.....	8
4 Results	9
4.1 Human capital by country of birth in New Zealand and Australia	9
4.2 Returns to human capital for non-migrants in New Zealand and Australia.....	12
4.3 Predicted wages in different locations in New Zealand and Australia ..	15
4.4 Allowing returns to human capital to vary by country of birth	19
4.5 Predicted wages for different immigrants in New Zealand and Australia	22
4.6 International transferability of human capital	26
5 Conclusions	28
References	30

TABLES

Table 1: Observable skills among local-born and migrants in New Zealand and Australia.....	10
Table 2: Returns to human capital for non-migrants in New Zealand and Australia.....	14
Table 3: Predicted wages for an average non-migrant in New Zealand and Australia.....	16
Table 4: Returns to human capital for individuals from different countries of birth in New Zealand and Australia	20
Table 5: Predicted wages for individuals from different countries of birth in New Zealand and Australia	22
Table 6: Returns to domestic compared with foreign acquired human capital in New Zealand and Australia	27

FIGURES

Figure 1: Distribution of the country of birth of individuals living in New Zealand and Australia	6
Figure 2: Distribution of years of education among local-born and migrants in New Zealand and Australia	12
Figure 3: Predicted wages for an average non-migrant in New Zealand and Australia by years of education.....	18
Figure 4: Predicted wages by migrant status in New Zealand and Australia by years of education	25

ACKNOWLEDGEMENTS

We thank Robert Haig, Mary Adams, Rob Hodgson, Sylvia Dixon, Deborah Cobb-Clark, Keith McLeod and Vasantha Krishnan for valuable comments. Access to the New Zealand Income Survey data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. This paper also uses confidentialised unit record file data from the Household, Income and Labour Dynamics in Australia survey (HILDA). The HILDA Project was initiated and is funded by the Department of Families, Housing, Community Services, and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). Funding for this project has been provided by IMSED Research, a service of the Department of Labour, and Victoria University of Wellington to whom we are grateful. Any views expressed are the sole responsibility of the authors and do not purport to represent those of the Department of Labour, Statistics New Zealand, FaHCSIA or MIAESR.

GLOSSARY

Human capital: The stock of knowledge and skills, embodied in an individual as a result of education, training and experience, that makes the individual more productive in the labour market.

Returns to human capital: The average additional return – usually measured in wages – due to a unit increase in any dimension of human capital. For example, returns to education or schooling refer to the average increase in wages in a population of individuals due to an additional year of education or schooling.

Observed human capital: A subset of measurable human capital for which a researcher has data. The concept of human capital generally includes both measurable variables such as years of education and years of labour-market experience, as well as typically unmeasurable variables such as motivation and social skills.

Unobserved human capital: Measurable human capital for which the researcher does not have data and unmeasurable human capital.

Selection: A situation in which the likelihood of an individual participating in a particular event or programme or joining a particular group relates to the change in outcomes that are expected to occur because of this action being taken. Selection makes it difficult to determine causation. For example, if migrants tend to be more motivated individuals than non-migrants, then estimates of returns to migration are likely to be overstated if the researcher does not take account of selection.

Positive selection: When individuals who will gain more from participating in a particular event or programme are more likely to participate. This is typically the type of selection expected when there are no restrictions on individual choice and the particular programme or policy is expected to have positive impacts.

Negative selection: When individuals who will gain less from participating in a particular event or programme are more likely to participate. This type of selection might occur because of the choices made by programme administrators (eg, a programme that targets people with poor expected outcomes), because of the interaction between institutions and outcomes (eg, people who have little to gain in the labour market might want to migrate to access a more generous welfare system), or because a programme provides some type of insurance that makes it attractive to people with worse expected outcomes.

Self-selection: The selection decision is made by the individual rather than someone else, such as a programme administrator.

Selection on observables: Selection that is related to characteristics that researchers are able to measure in their data (ie, things that are observable). For example, migrants might be more educated and older than non-migrants.

Selection on unobservables: Selection that is related to characteristics that researchers are not able to measure in their data (ie, things that are unobservable). For example, adventurousness might be related to both whether individuals decide to become migrants and how well they do in the labour market.

Potential labour-market experience: An individual's age minus their years of education minus the age at which individuals typically start school in the country. This measure is often typically used as a proxy for actual labour-market experience when this information is unavailable. It assumes that workers participate continuously in the labour force once they complete their formal education.

Purchasing power parity (PPP) exchange rate: An exchange rate that accounts for different costs of goods in different countries. It is calculated as the rate that allows one unit of currency in one country to purchase the same basket of goods in another country. This allows researchers to directly compare wages (and other outcomes) across countries with different currencies and prices.

EXECUTIVE SUMMARY

Trans-Tasman migration accounts for more than half of New Zealand's international migration flows, meaning that movement to Australia is a central driver of New Zealand's overall migration trends. Additionally, the relatively high emigration to Australia of economically active people from New Zealand has implications for the domestic labour market and labour-related immigration policy.

This paper reports findings from the first part of a larger project examining for the New Zealand-born and Australian-born as well as immigrants the economic dimensions of the decision to reside in Australia or New Zealand. The research examines the relationship between education, work experience and wages in New Zealand and Australia for individuals born in different countries in order to examine the skill transferability for migrants from different countries and backgrounds.

In this paper, we use unit record survey data from the 2008 and 2009 New Zealand Income Survey and the 2006, 2007, and 2008 Household, Income and Labour Dynamics in Australia survey to examine four aspects of trans-Tasman migration.

First, we describe how the observed human capital of the New Zealand-born living in New Zealand compares with that of the Australian-born living in Australia, trans-Tasman migrants and other migrants to both countries.

Second, we use regression analysis to estimate the relationship between observed human capital and pre-tax hourly wages for the above groups, controlling for other factors that are related to individual wages.

Third, we extend this analysis to examine whether the relationship between human capital and wages varies for immigrants from different source countries and by where the human capital was acquired.

Fourth, we discuss how this information can be used to tell us something about whether particular migrants are positively or negatively selected on unobservable characteristics (eg, ambition).

Our main results are as follows.

1. Trans-Tasman comparison of education and work experience for the New Zealand-born, Australian-born and other migrants.
 - New Zealand-born individuals living in New Zealand have, on average, the same level of education as New Zealand migrants living in Australia and Australian-born individuals living in Australia. This is in contrast to anecdotal evidence that Australia mainly attracts highly-skilled New Zealanders. On the other hand, Australian-born migrants living in New Zealand are more educated than Australian-born individuals who remain in Australia. Therefore, more highly educated Australian-born individuals appear attracted to New Zealand.
 - Immigrants to both New Zealand and Australia are more educated than non-migrants in either country. This is unsurprising considering both countries run migration systems that focus on high-skilled migration.

- Migrants from the United Kingdom (UK), South Africa, and Europe and the Americas living in New Zealand are more educated than migrants from these countries living in Australia.
 - Migrants from India, China and other Asian countries living in New Zealand are less educated than migrants from these countries living in Australia.
 - These results are based on the current stock of migrants living in Australia and New Zealand and do not necessarily represent the patterns occurring in the recent migrant inflows into each country and trans-Tasman migration between them.
2. Trans-Tasman comparison of wages for the New Zealand-born, Australian-born and other migrants.
- The impact of education and experience on pre-tax hourly wages for non-migrants are similar on both sides of the Tasman. An additional year of education leads to 8% higher wages, and an additional year of experience leads to 1.1% higher wages for a young worker, 0.4–0.5% higher wages for a middle-aged worker and zero to 0.3% lower wages for an older worker.
 - Pre-tax wages (adjusted for national-level differences in living costs) are 19% higher for an average New-Zealand-born person in the average location in Australia than for an identical worker in the average location in New Zealand. However, for this same worker, wages in the high-wage New Zealand locations of Wellington and Auckland would be as high as those in the low-wage Australian locations of Adelaide, inner regional areas and rural areas.
 - In New Zealand, among migrants, only those from the UK earn more, on average, than similarly skilled New Zealand-born. Average migrants from India, South-East Asia, the Pacific Islands, China and other Asian countries earn significantly less than comparable New Zealand-born workers. This is the case even though returns to education in New Zealand are particular high for immigrants from Europe and the Americas, South-East Asia and South Africa. Only among immigrants from Australia are returns to education lower than for the New Zealand-born.
 - In Australia, no migrant groups earn more than similarly skilled Australian-born and migrants from New Zealand and the UK earn about the same. Similar to what we find for New Zealand, migrants from South-East Asia, the Pacific Islands and China all earn significantly less than equivalent Australian-born workers. This is true even though the returns to education are generally the same for immigrants and non-migrants.
 - In general, education acquired abroad is rewarded the same in the New Zealand and Australian labour markets as is education acquired domestically.

Overall, the results suggest that in New Zealand, immigrants from South Africa, the UK and Europe and the Americas are positively selected on both observables and unobservables (ie, these immigrants are more highly educated and appear

more motivated than the New Zealand-born). On the other hand, Australian-born migrants in New Zealand appear to be negatively selected on unobservables (ie, less motivated) even though they have higher levels of education than the New Zealand-born. The finding for immigrants from the Pacific Islands and Asia suggest that factors such as poor job networks, poor English language skills and labour-market discrimination have an important influence on wages for these workers. Analogous results are found for these migrant groups in Australia suggesting that similar factors exist in both labour markets leads to lower average wages for these workers compared with those born elsewhere.

In summary, we find little evidence of a trans-Tasman brain drain from New Zealand. In-fact, New Zealanders living in Australia generally have the same characteristics as those remaining in New Zealand and receive the same returns to their human capital. One interesting question for future research is why, given the fairly sizeable gap in average wages between the high-wage Australian areas of Canberra, Sydney, Melbourne and Perth and even the high-wage areas of New Zealand, more New Zealanders do not move to Australia. One possible reason is that differences in living expenses and taxes between these locations are not captured using the overall purchasing power parity exchange rate. Another possible reason is that better amenities and a higher quality of life in New Zealand compensate for wage differences. Supporting this hypothesis, Australians in New Zealand are more skilled than Australians in Australia even though average wages and returns to human capital for these workers are much lower in New Zealand.

1 INTRODUCTION

Choosing whether to live in New Zealand or in Australia is a decision that both international migrants and the citizens of both countries often need to make. Both countries operate migration systems that seek to attract the highly-skilled (BusinessNZ 2003) and the citizens of each country are completely free to work and live in either (Bedford et al 2006; Hugo 2004). Recent articles in the popular news media suggest that the best and brightest New Zealanders are moving to Australia at an increasing rate (Collins 2005; New Zealand Press Association 2008a, 2008b, 2008c), and the general sentiment has often been that immigrants use New Zealand as a backdoor to entry to Australia (New Zealand Press Association. 2008d).

In this paper, we use unit record survey data from the 2008 and 2009 New Zealand Income Survey (NZIS) and the 2006, 2007 and 2008 Household, Income and Labour Dynamics in Australia survey (HILDA) to examine four aspects of trans-Tasman migration.

First, we describe how the observed human capital of the New Zealand-born living in New Zealand compares with that of the Australian-born living in Australia, trans-Tasman migrants and other migrants to both countries.

Second, we use regression analysis to estimate the relationship between observed human capital and wages for the above groups, controlling for other factors that are related to individual wages.

Third, we extend this analysis to examine whether the relationship between human capital and wages varies for immigrants from different source countries and by where the human capital was acquired.

Fourth, we discuss how this information can be used to tell us something about whether particular migrants are positively or negatively selected on unobservable characteristics (eg, ambition).

This work is the first part of a larger project that intends to examine for the New Zealand-born and Australian-born as well as immigrants the decision to reside in Australia or New Zealand. The project will examine the role that four possible drivers play in trans-Tasman migration decisions: differences in labour-market opportunities; differences in the provision and quality of public services (eg, welfare benefits, health and education); life-cycle concerns such as finding a partner, deciding where to raise children and taking care of one's parents; and macroeconomic differences in long-term economic growth and in the timing of business cycles.

The overall project is joint work between Steven Stillman at Motu and the University of Waikato, Malathi Velamuri at Victoria University Wellington, Mathias Sinning at ANU, and Deborah Cobb-Clark at the Melbourne Institute for Applied Economic Research.

2 BACKGROUND

Pioneering work by Robinson and Tomes (1982) and Borjas (1987) modelled migration decisions based on the idea that individuals move to places that offer the highest returns to their skills. Unfortunately, it is difficult to empirically test these models, because immigration policies restrict the free flow of individuals between countries and comparable data are typically lacking for both home and destination countries. However, since all Australian and New Zealand citizens can work in either country and comparable survey data exists for both, it is possible to examine the role of self-selection in both trans-Tasman migration flows and inflows of international migrants into both Australia and New Zealand.

Given the sizeable migration flows to New Zealand and Australia and the large bilateral flows of individuals across the Tasman Sea, one would expect considerable self-selection among the movers. Consistent with this expectation, McKenzie et al (forthcoming) show that self-selection is important among medium-skill Pacific Island migrants to New Zealand. However, there is not yet any general evidence on the role of self-selection among migrants to and between Australia and New Zealand.¹

Our empirical work focuses on three informative comparisons of differing returns to human capital. First, we examine the returns to human capital among non-migrants in both New Zealand and Australia. This comparison shows the extent to which the demand for skilled workers varies across the two countries, potentially because of differences in both industrial structure and the size of each domestic economy.

Second, we examine how returns to human capital differ for trans-Tasman migrants compared with non-migrants in each country. Because human capital should be fully transferable between Australia and New Zealand and discrimination is unlikely for trans-Tasman migrants, any differences in the estimated returns to human capital should mainly reflect differences in the unobservable characteristics of these migrants. However, it is possible that weaker job networks could explain lower returns to human capital for trans-Tasman migrants.

Third, we examine how returns to human capital differ for other immigrant groups in each country compared with non-migrants. It is still the case that if immigrant groups are found to have higher returns to human capital, then they are likely to be positively selected on unobservables, but a finding of lower returns to human capital could be indicative of having worse unobservables or could arise for other reasons besides skill selectivity. For example, human capital acquired by migrants in their home country may not be fully transferable to the destination country, there might be labour-market discrimination against migrants in the destination country, or informal networks may play an important role in job matching and migrants may have less developed networks in the destination country.

¹ Chiquiar and Hanson (2005) and Clemens et al (2008) use similar methods as in this paper to look at self-selection among Mexican migrants to the United States.

3 DATA

3.1 New Zealand Income Survey and Household, Income and Labour Dynamics in Australia survey

This paper uses unit record data from the NZIS and HILDA.

Since 1997, the NZIS has been carried out by Statistics New Zealand each June quarter as a supplement to the Household Labour Force Survey (HLFS). The HLFS surveys approximately 15,000 households and 28,000 adults each quarter using an eight quarter rotating panel setup.² Taken together, the two surveys collect data on household structure, the socio-demographic characteristics of household members, labour force activity in the reference week and recent incomes for individuals aged at least 15.

HILDA began in 2001 and collects longitudinal information from a nationally representative sample of more than 7,600 Australian households encompassing almost 20,000 individuals aged 15 and older (see Wooden et al 2002). It collects information about economic and subjective well-being, labour-market dynamics and family dynamics. Individuals in sample households are followed regardless of whether they remain in the original households.

3.2 Defining country of birth

The HLFS and HILDA each collect information on how many years each individual has lived in New Zealand and Australia, respectively, and their country of birth. In the HLFS, before 2008, country of birth was coded to a classification that could be aggregated up to four meaningful groups: Australia, the United Kingdom, the Pacific Islands and Asia, and a residual category for all other foreign-born individuals. However, since 2008, country of birth has been coded at a much more disaggregated level that allows us to identify the following eleven countries and regions: New Zealand, Australia, the UK, the Pacific Islands, China, India, South Africa, South-East Asia, Europe and the Americas, Other Asia, and Other. Hence, we use data from the 2008 and 2009 waves of the NZIS.

In HILDA, country of birth is coded at the individual country level, so can be easily aggregated to match the classification used in the NZIS. The latest wave of HILDA covers 2008. We use data from the 2006 to 2008 waves to increase the sample size to one comparable with the NZIS. However, given that this mainly gives us repeated observations on the same individuals, we still have a smaller effective sample size than for the NZIS.

² Only 85% of these respondents to the HLFS also complete the NZIS. Responses are imputed for the remaining individuals. We discuss below how we treat this data. Sampling weights are calculated by Statistics New Zealand to increase the representativeness of the HLFS and are used in all analyses in this paper.

3.3 Defining the analysis sample

For our analysis with both the NZIS and HILDA, we restrict the sample to individuals aged 25–59 with non-missing information on country of birth who have been residing in Australia or New Zealand for at least 5 years. We focus on prime-age individuals to abstract from trans-Tasman differences in educational systems and retirement norms. As HILDA started in 2001 and is a longitudinal survey, the only immigrants in the 2006 wave who have been in Australia less than 5 years are those that subsequently joined households that were already in Australia in 2001. Hence, these individuals are not representative of the overall population of recent migrants. This argues that we should focus on immigrants who have been in either country for at least 5 years to have comparable and representative samples. Given that it typically takes immigrants some time to adjust to their new labour market, this restriction also makes sense if we want to estimate the returns to human capital for established immigrants.³

We also drop a limited number of observations that have missing information on qualifications, marital status or household composition, as well as a small number of Aboriginal peoples and Torres Strait Islanders in HILDA. This results in a sample of 24,628 New Zealand-born and 6,049 foreign-born individuals living in New Zealand and 17,344 Australian-born and 4,742 foreign-born individuals living in Australia.

³ We examined whether our main results on the returns to human capital for immigrants in each country are robust to further excluding individuals who have lived in Australia or New Zealand for less than 10 years and found that changing our analysis sample in this way had little effect.

Figure 1 displays the breakdown of the estimated prime-age population in New Zealand and Australia by country of birth. Overall, nearly 22% of the Australian prime-age population is foreign-born with 12% of these immigrants being New Zealand-born. Similarly, 21% of the New Zealand prime-age population is foreign-born, but only 6% of these immigrants are Australian-born. Besides the large difference in the scale of trans-Tasman migration, considerably more immigrants born in the Pacific Islands and fewer born in Europe and the Americas reside in New Zealand than in Australia. Otherwise, the composition of immigrants by country of birth is similar in the two countries.

Figure 1: Distribution of the country of birth of individuals living in New Zealand and Australia



3.4 Measuring human capital

One important task for our analysis is to define human capital in each data set. Unfortunately, the educational systems are somewhat different in Australia and New Zealand, so the questions on qualifications and schooling are asked differently in the NZIS and HILDA. In the NZIS, the focus is on qualifications earned at both the school and post-school level. In HILDA, the final school grade is collected along with post-school qualifications. An additional complication is in the treatment of qualification earned overseas. HILDA asks questions about in which country schooling was completed and where the last post-school qualification was earned. On the other hand, NZIS has a special category for school qualifications earned overseas that do not have a New Zealand equivalent, but does not ask additional questions about the countries where school or post-school qualifications were earned.

To allow us to estimate comparable models of the returns to education in each country, we used the variables discussed above to estimate the number of total years spent by each individual in school and post-school education.⁴ We then calculated the number of years of potential labour-market experience for each individual as their age minus their total years spent in education minus five

⁴ The aggregated classifications of no qualifications/did not finish school, some school qualifications/finished school, non-degree post-school qualifications, and university degree can be defined in a (fairly) comparable way in the NZIS and HILDA, and we have estimated models using this approach as well. However, it is less straightforward to interpret the results when a discrete categorisation is used, so we focused on examining the returns to years of education.

(ie, the school starting age). This is a necessary approximation for actual labour market experience that is collected in only HILDA and not in the NZIS.⁵

Specifically, for New Zealand, individuals with no school qualifications are assumed to have spent 9 years in school, those with primary proficiency 10 years, those with level 1 school qualifications (ie, school certificate) 11 years, those with level 2 school qualifications (ie, sixth form exams) 12 years, and those with level 3 or 4 school qualifications (ie, university entrance, higher school certificate, bursary or scholarship) 13 years. Individuals with overseas school qualifications or other school qualifications are assumed to have spent 11–12 years in school, depending on their country of birth (we use the Barro-Lee data set on worldwide educational attainment to estimate the average years of schooling for individuals who have completed secondary school in different countries).

Similarly, individuals whose highest post-school qualification is a technician's certificate are assumed to have spent 0.5 additional years in post-school education;; those whose highest post-school qualification is a trade certificate, advanced trade certificate or other certificate 1 additional year, those whose highest post-school qualification is a nursing, teaching, local polytechnic, university or New Zealand certificate or diploma 1.5 additional years;; those whose highest post-school qualification is a bachelors degree 3 additional years;; and those whose highest post-school qualification is a post graduate degree, certificate or diploma 4.5 additional years.

For Australia, years of schooling are equal to the highest grade completed, with individuals who did not attend secondary school but finished primary school assumed to have 6 years of schooling, and those who attended primary school but did not finish assumed to have 5 years of schooling. Then, individuals whose highest post-school qualification is a level 1 or 2 certificate or an unidentified certificate are assumed to have spent 0.5 additional years in post-school education, those whose highest post-school qualification is a level 3 or 4 certificate 1 additional year, those whose highest post-school qualification is a diploma or advanced diploma 2 additional years, those whose highest post-school qualification is a bachelors degree 3 additional years, those whose highest post-school qualification is graduate certificate or diploma 4 additional years, and those whose highest post-school qualification is a masters or doctorate 5 additional years.

In this paper, we also examine the extent to which human capital acquired by migrants in their origin country is transferable to the destination country. We do this by calculating the number of years spent in education in the destination country compared with the number of years spent in education overseas. In the NZIS, we do this by comparing an individual's age at arrival to their years of school and total years of education. To be consistent with the information collected in HILDA, if an individual arrived in New Zealand before finishing school (post-school), then all years of school (post-school) are considered to have been earned in New Zealand. The only exception is when the school qualification is classified as being an overseas qualification in which case all years of schooling

⁵ We examined whether using potential rather than actual experience biases the results for either returns to education or experience in HILDA, but found that this has little impact on the results.

are considered to have been earned overseas. In HILDA, we use the information on the country in which schooling was completed and in which the last post-school degree was earned to divide years of schooling into that acquired in Australia compared with overseas.⁶

We also split potential experience into that accumulated abroad compared with in the destination country. This is done in each data set solely using information on an individual's age at arrival and their years of education. Unfortunately, this means we cannot estimate whether the returns to domestic and foreign work experience differ as this is perfectly collinear with the amount of time living in the destination country, which is also an important factor in determining individual wages.

3.5 Measuring wages

Our focus in this paper is on estimating the relationship between an individual's human capital and their pre-tax hourly wage, which in a perfectly competitive market corresponds to their relative productivity. Hourly wages are measured for all workers by dividing the sum of actual gross income from wage and salary employment in the last week and actual gross self-employment income in the last year divided by 52, by total hours worked in the last week. Individuals reporting real wages less than \$5 per hour or greater than \$250 per hour in either country are recoded to missing along with all individuals with imputed data.

All wage figures are converted to local 2008 dollars using the official consumer price index for the country being examined. In some analyses, real wages in Australia are then further converted to real New Zealand dollars using the 2005 purchasing power parity (PPP) exchange rate of 1.0935 New Zealand dollars per Australian dollar derived by the OECD and downloaded from its website. The official exchange rate ranged from 1.1151 to 1.2701 New Zealand dollars per Australian dollar during the sample period and hence using the actual rate instead of the PPP exchange rate leads to a larger divergence in wages between New Zealand and Australia.⁷ Because of the complexities of the tax system and its interdependence with decisions on how many hours to work, we do not attempt to further adjust for differences between Australia and New Zealand in the relationship between gross wages and disposable incomes.

⁶ Some Australian-born individuals are classified with overseas qualifications using this approach and we allow for this in our empirical analysis. Similarly, a small number of New Zealand-born individuals have overseas school qualifications, so are also classified with having some overseas education.

⁷ Both the official exchange rate and the PPP exchange rate are meaningful for making comparisons between wages in Australia and New Zealand, depending on whether one wants to control for differences in living costs in the two countries rather than asking how would savings in one country translate to purchasing in the other.

4 RESULTS

4.1 Human capital by country of birth in New Zealand and Australia

We begin by examining the human capital of individuals from different countries of birth residing in Australia and New Zealand. This gives an indication of the degree of selection on observables among trans-Tasman migrants along with the relative skills of different immigrant groups both within Australia and New Zealand and compared across the two countries. Table 1 presents the mean years of education, the percentage of individuals with no qualifications in New Zealand or who have not finished high school in Australia,¹ the percentage of individuals with university degrees, and the mean years of potential experience by country of birth and country of residence. Additional information is given on the breakdown of years of schooling and potential experience between that earned abroad and that earned domestically.

Three interesting facts emerge from Table 1. First, the Australian-born living in Australia have, on average, the same number of years of education as the New Zealand-born living in New Zealand. However, the educational distribution is much more inequitable among the Australian-born in Australia, with both having not finished school/having no qualifications and having a university degree more common than for the New Zealand-born in New Zealand.

Second, New Zealanders living in Australia are similarly educated as the New Zealand-born living in New Zealand. Hence, the anecdotal evidence that Australia, on average, attracts high-skilled New Zealanders does not seem to be true. For example, while 21% of New Zealanders in Australia have university degrees, 22% have not finished school.

Third, the Australian-born living in New Zealand are more educated than the Australian-born living in Australia by an average of 0.42 years of education, so are also more educated than the New Zealand-born living in New Zealand. Therefore, it appears that New Zealand does attract Australians who are more skilled than the average Australian-born person living in Australia.

¹ For this simple descriptive comparison, we assumed that not having finished school in Australia is equivalent to not having any school qualifications in New Zealand. As is shown in Figure 2, many Australian school leavers spend some time in high school, which could be considered equivalent to having low-level school qualifications in New Zealand. This is one of the main reasons why our main analysis focuses on our continuous measure of years of education.

Table 1: Observable skills among local-born and migrants in New Zealand and Australia

Country of Birth	New Zealand	Australia	All Immigrant	UK	Pacific Islands	China	India	South Africa	South-East Asia	Europe / Americas	Other Asia	Other Foreign
Living in New Zealand												
Mean Years of Education	12.36	12.79	12.60	12.75	11.11	13.05	13.21	14.04	12.31	13.05	13.56	12.46
Proportion No Qualifications	0.205	0.110	0.179	0.113	0.403	0.150	0.161	0.030	0.270	0.090	0.054	0.193
Proportion University Degree	0.190	0.288	0.320	0.272	0.079	0.445	0.516	0.431	0.327	0.377	0.544	0.371
Mean Years Potential Experience	24.87	23.75	24.75	27.45	25.24	20.91	21.62	22.94	22.91	26.33	23.51	25.06
Mean Years of Domestic Educ	12.20	7.16	3.90	6.48	2.89	2.04	0.74	2.60	3.07	4.90	2.04	2.71
Mean Years of Foreign Educ	0.16	5.64	8.71	6.27	8.22	11.01	12.47	11.44	9.23	8.16	11.52	9.75
Mean Years of Domestic Exper	24.87	18.37	15.86	20.65	17.11	10.56	10.17	11.48	13.28	17.98	10.73	14.41
Mean Years of Foreign Exper	0.00	5.38	8.90	6.80	8.13	10.35	11.44	11.46	9.63	8.34	12.78	10.65
Sample Size	24,628	373	6,049	1,387	1,356	485	387	224	382	516	266	673
Percent of Population	0.788	0.013	0.212	0.051	0.035	0.021	0.013	0.009	0.015	0.019	0.013	0.025
Living in Australia												
Mean Years of Education	12.43	12.37	12.86	12.61	12.54	13.97	14.77	13.76	12.81	12.78	13.80	12.70
Proportion Didn't Finish School	0.224	0.253	0.186	0.233	0.167	0.071	0.023	0.045	0.159	0.191	0.123	0.215
Proportion University Degree	0.210	0.264	0.350	0.318	0.226	0.495	0.699	0.388	0.407	0.345	0.535	0.326
Mean Years Potential Experience	25.39	24.08	26.45	28.59	21.41	23.29	25.18	24.97	24.56	28.22	21.72	26.64
Mean Years of Domestic Educ	3.75	12.30	5.82	7.63	6.69	4.25	3.26	4.93	5.10	6.54	3.75	4.45
Mean Years of Foreign Educ	8.68	0.07	7.04	4.97	5.85	9.72	11.51	8.84	7.71	6.24	10.04	8.26
Mean Years of Domestic Exper	19.92	24.08	20.81	24.72	16.53	14.72	17.68	17.29	17.59	22.95	14.15	19.26
Mean Years of Foreign Exper	5.47	0.00	5.64	3.87	4.87	8.57	7.50	7.68	6.97	5.27	7.57	7.38
Sample Size	566	17,344	4,742	1,278	186	182	133	134	622	1,088	228	325
Percent of Population	0.026	0.785	0.215	0.058	0.008	0.008	0.006	0.006	0.028	0.049	0.010	0.015

Notes: See the paper for further information on how the variables are defined. All New Zealand figures incorporate sampling weights except for the sample size.

We now turn to the results for immigrant groups. First, we see that on average, immigrants in both New Zealand and Australia are more educated than non-migrants. This is unsurprising considering that both countries run migration systems that focus on high-skilled migration.

Second, among migrant groups in New Zealand from different regions, individuals from the Pacific Islands are the least skilled (in fact, they are the only migrant group with lower education levels than the New Zealand-born), while migrant groups from South Africa, Other Asia (mainly Japan and Korea), India, Europe and the Americas, and China are the most skilled (in descending order).

Third, among the same groups in Australia, individuals from the UK and Pacific Islands are the least skilled (but both are still more skilled than the average Australian-born), while those from India, China, Other Asia and South Africa are the most skilled.

Fourth, comparing the migrant populations in New Zealand to those in Australia shows that migrants from the UK, South Africa, and Europe and the Americas living in New Zealand are relatively more skilled than individuals from these countries living in Australia, while the opposite is true for the remaining, mainly Asian, countries.

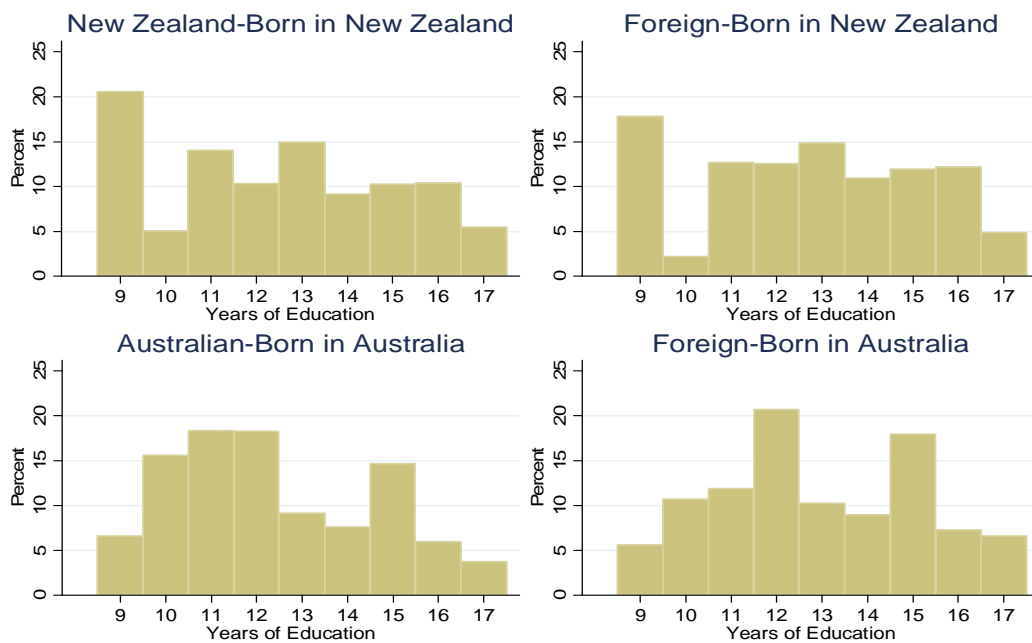
Table 1 also shows the proportion of human capital that has been acquired in the destination country for immigrants in New Zealand and Australia. This varies considerably across source countries. For example, among all immigrants in New Zealand, 31% of the average immigrant's years of education were acquired in New Zealand along with 64% of their work experience. Migrants in Australia have acquired an even larger share of their human capital there, with 45% of their years of education and 79% of their work experience acquired in Australia. These figures vary substantially across source countries. For example, in New Zealand, 56% of the average Australian-born and 51% of the average UK-born migrant's education was earned in New Zealand compared with only 6% of the average Indian-born migrant's education. A similar pattern is seen for Australia, with 61% of the average UK-born migrant's education earned locally compared with 22% of the average Indian-born migrant's education. One interesting difference among trans-Tasman migrants is that New Zealanders living in Australia have acquired only 30% of their education there.

In Figure 2, we further explore how the distribution of years of education differs for the New Zealand-born in New Zealand, immigrants in New Zealand, the Australian-born in Australia and immigrants in Australia. It is apparent that differences in the education systems in each country and in how education is measured in the NZIS and HILDA have a large impact on the distribution of years of education. A large proportion of the New Zealand-born in New Zealand (above 20%) has 9 or less years of education, which results from their having no formal school qualifications. On the other hand, the majority of Australian-born school leavers in Australia make it until at least the 10th or 11th grade, where, unlike in New Zealand, there is no opportunity to earn a 'qualification' without finishing high school. There are also larger differences at the upper-end of the distribution with an equal proportion of the New Zealand-born in New Zealand (around 10%) having 14–16 years of education while most of the Australian-

born in Australia in this area of the distribution have 15 years of education (ie, 12 years of school plus 3 years of university).

Comparing immigrants and non-migrants in each country also reveals large differences between Australia and New Zealand. In New Zealand, the distribution of years of education among immigrants is quite similar to that for non-migrants, but with fewer individuals having 9–11 years of education and more having 12–16 years. On the other hand, in Australia, immigrants compared with non-migrants are highly concentrated at 12 years and 15 years of education, with comparatively few leaving school in the 10th or 11th grade.

Figure 2: Distribution of years of education among local-born and migrants in New Zealand and Australia



4.2 Returns to human capital for non-migrants in New Zealand and Australia

We next examine the relationship between (log) hourly wages and human capital for non-migrants in New Zealand and Australia. We do this by estimating a standard Mincerian wage regression that controls for both the educational attainment and potential experience of each individual, as well as additional observable characteristics that are related to wages, including each individual's gender, marital status and household type, the geographic region and urbanisation of their household, and the survey year (Mincer 1974).

We estimate separate regression models for individuals living in New Zealand and those living in Australia and assume that returns to human capital are the same for all non-migrant workers in each country.¹ We also assume that selection into employment does not have a meaningful impact on our results. In other words, the returns to education for workers in New Zealand and Australia are assumed to be the same as those for non-workers if they were working.

Results from estimating these models are presented in Table 2. The coefficients in the first row of the table indicate the estimated average return to a year of education for a New Zealand-born worker in New Zealand and an Australian-born worker in Australia. For each year of education, a New Zealand-born worker in New Zealand earns 7.6% higher wages while an Australian-born worker in Australia earns 8.1% higher wages.² While the return to a year of education is 0.5% higher among the Australian-born in Australia, it is not statistically distinguishable from the return to a year of education among the New Zealand-born in New Zealand. This is also arguably a qualitatively small difference, with the cumulative return to education 6.5% higher for the average educated non-migrant worker (ie, with 12.26 years of education) in Australia than in New Zealand.³

¹ Our data access arrangement does not allow us to pool the NZIS and HILDA data to estimate interacted models. However, given that these samples are independent by design, regression coefficients can be directly compared across the two samples only using the presented information on the standard error associated with each coefficient. In unreported results, we examined whether returns to education and experience differ by gender in each country. In neither Australia nor New Zealand do we find that returns to education are different for men and women. On the other hand, returns to work experience are one-half as large for women in New Zealand than for men and one-third as large for women in Australia than for men. This is consistent with potential experience being a worse proxy for actual experience for women or with there being true gender differences in returns to experience. This is something that we cannot explore further in the NZIS and we leave for future work in HILDA. We also examined whether the returns to education and experience co-vary. In both countries, we find a small negative interaction effect. In other words, returns to education are higher for less experienced workers or returns to experience are less for more educated workers, or both. Again, exploring this further is left for future work.

² Because the dependent variable in the regression model is log hourly wage, these coefficients can be converted to percent differences using the formula: percent change = $100 * (\exp(\text{coefficient}) - 1)$.

³ We also estimated regression models where we allowed the returns to education to be completely non-linear. While we did find a reasonable amount of non-linearity in the returns, our general findings remain unchanged. For example, in New Zealand, non-migrants with 12 years of education are now estimated to earn 17.9% more than those with less than 10 years of education, while in Australia, the cumulative return for these same individuals is 19.5%. Similarly, non-migrants with 16 years of education are estimated to earn 56.8% more than those with less than 10 years of education in New Zealand and 55.2% more in Australia. Given the difficulty in comparing non-linear returns for different groups and the potential for greater measurement error in these estimates (because of inaccuracies in the conversion of qualifications to years of education and because we have limited information on years spent in education that did not result in qualifications), we focus on the results from regression models that assume (log-)linear returns to years of education.

Table 2: Returns to human capital for non-migrants in New Zealand and Australia

Dependent Variable: Log Real Wage	New Zealand	Australia
Years of Education	0.0732** (0.002)	0.0781** (0.003)
Years Potential Experience	0.0217** (0.002)	0.0197** (0.002)
Years Pot Exp Squared / 100	-0.0360** (0.004)	-0.0284** (0.005)
Marginal Effect at 15 Years Potential Exp	0.011** (0.001)	0.011** (0.001)
Marginal Effect at 25 Years Potential Exp	0.004** (0.000)	0.005** (0.001)
Marginal Effect at 35 Years Potential Exp	-0.003** (0.001)	0.000 (0.001)
Female	-0.146** (0.009)	-0.122** (0.011)
Married	0.0926** (0.020)	0.102** (0.022)
Couple with No Children vs Non-Family	0.025 (0.023)	-0.003 (0.024)
Couple with Children vs Non-Family	0.030 (0.021)	-0.015 (0.022)
Single Parent vs Non-Family	-0.014 (0.019)	-0.015 (0.019)
Year = 2006 vs Year = 2008		-0.0279** (0.007)
Year = 2007 vs Year = 2008		0.006 (0.007)
Year = 2009 vs Year = 2008	0.0235* (0.010)	
R-squared	0.189	0.187
Observations	15,634	12,954

** p<0.01, * p<0.05, + p<0.1. Robust standard errors in parentheses that account for repeated observations for individuals over time in Australia and survey clustering in New Zealand. Each regression also controls for the geographical region and urbanisation of the household.

The returns to potential experience are allowed to be non-linear (specifically, quadratic), which better fits both the data and theoretical models of human capital formation, which show that returns to experience should decline as experience increases (Mincer 1974). Thus, it is easiest to interpret these results by evaluating them at several points along the distribution of potential experience. We have done this for 15, 25 and 35 years of potential experience. Accordingly, the returns to an additional year of experience for a non-migrant worker with 15 years of potential experience are 1.1% in both New Zealand and Australia, for someone with 25 years of potential experience are 0.4% in New Zealand and 0.5% in Australia, and for someone with 35 years of potential experience are -0.3% in New Zealand and 0% in Australia.

Overall, the returns to human capital for non-migrants are similar on both sides of the Tasman, which is consistent with the two labour markets being integrated and there being large flows of individuals both between them and into them from abroad. In other words, the demand for higher skilled workers appears to be the same on either side of the Tasman even though there are large differences in the industrial structure and size of the Australian and New Zealand labour markets.

Turning to the other results, we find that the gender wage gap is slightly larger (but not significantly so) in New Zealand, with women on average, earning 13.6% lower wages than men with equivalent human capital compared with a difference of 11.5% in Australia. We also find that the marriage wage premium is slightly larger (but not significantly so) in Australia, with married individuals earning, on average, 10.7% higher wages compared with 9.7% more in New Zealand. In neither country is there a relationship between household type and wages. In New Zealand, average real wages were 2.4% higher in 2009 than in 2008, while in Australia they were 2.7% lower in 2006 than in either 2007 or 2008, during which average real wages were the same.

4.3 Predicted wages in different locations in New Zealand and Australia

The results presented in Table 2 describe the relationship between human capital and wages in Australia and New Zealand. The estimated regression coefficients along with the unreported coefficients on geographical region and urbanisation (and the model constant) can also be used to predict the wage that would be earned by a particular worker in different locations in Australia and New Zealand. Table 3 does just this using the characteristics of the average non-migrant in New Zealand and the appropriate settings for the control variables for the geographical region and urbanisation of the household for each particular location (and for 2008 in both countries). The first column presents the geometric mean wage in 2008 New Zealand dollars for this identical hypothetical worker living in various locations.⁴ The long-run purchasing power parity exchange rate of 1.0935 New Zealand dollars per Australian dollar is used to convert currencies.⁵ We also calculate confidence intervals for these results using the estimated standard error of each prediction, which are presented in the second and third columns of Table 3.

The results presented in the first row of each panel show that a hypothetical individual with the characteristics of the average non-migrant in New Zealand, living in the average location in New Zealand is predicted to earn, on average, 21.85 New Zealand dollars per hour. If this same individual lived in the average location in Australia they would earn 26.46 PPP New Zealand dollars per hour. In other words, the average non-migrant New Zealander would earn a statistically significant 19% higher wage in the average location in Australia than in the average location in New Zealand.

⁴ In other words, the regression coefficients are used to predict log wages, with the mean and confidence intervals for these predictions then converted to levels. This approach reduces the impact of very high wage rates on the calculation of the sample mean.

⁵ Predicted wages in all Australian locations are 5% higher when the exchange rate on 15 June 2008 is used instead.

Table 3: Predicted wages for an average non-migrant in New Zealand and Australia

Location	Mean Wage (NZD-PPP)	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Compared to Other Country Average	Compared to Within Country Average
New Zealand - Average Location	21.85	21.54	22.16	-19.2%*	
Auckland	24.11	23.52	24.72	-9.3%*	9.9%*
Wellington	24.66	23.76	25.60	-7.1%*	12.1%*
Christchurch	21.43	20.82	22.07	-21.1%*	-1.9%
Other Main Urban Areas in NZ	20.97	20.62	21.33	-23.3%*	-4.1%*
Secondary and Minor Urban Areas in NZ	20.06	19.66	20.46	-27.8%*	-8.6%*
Rural Areas in NZ	20.50	19.90	21.11	-25.6%*	-6.4%*
Australia - Average Location	26.47	26.14	26.81	19.2%*	
Sydney	29.25	28.44	30.09	29.2%*	10.0%*
Melbourne	27.91	27.16	28.68	24.5%*	5.3%*
Brisbane	26.17	25.38	26.99	18.1%*	-1.1%
Adelaide	24.94	24.08	25.83	13.2%*	-6.0%*
Perth	28.29	27.10	29.54	25.8%*	6.7%*
Canberra	29.83	28.05	31.73	31.2%*	12.0%*
Inner Regional Areas in Australia	24.95	24.44	25.47	13.3%*	-5.9%*
Rural Areas in Australia	24.85	24.10	25.63	12.9%*	-6.3%*

All amounts are in 2008 NZ dollars. Figures are predicted values from the regressions results presented in Table 2 using the characteristics of the average non-migrant in New Zealand and the appropriate settings for the control variables for the geographical region and urbanisation of the household. Mean log values and confidence intervals are then converted to levels, hence these figures are geometric means. Differences that are significant at the 5% level are followed by a *. The long-run purchasing power parity change rate of 1.0935 New Zealand dollars per Australian dollar is used to convert currencies. Predicted wages in Australia are 5 percent higher when the exchange rate on 15 June 2008 is used instead.

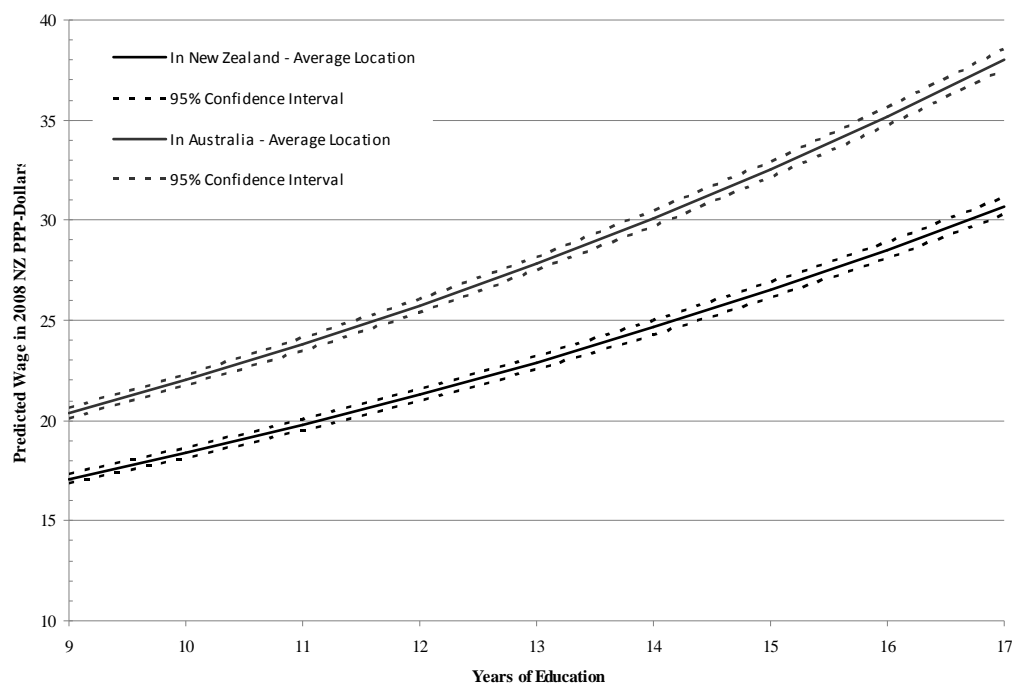
To put this premium into perspective, we also examine how average wages vary across different locations in each country. Individuals living in secondary and minor urban areas in New Zealand are the lowest paid workers in New Zealand, while those living in Wellington are the highest paid.¹ This difference is large. The hypothetical worker discussed above is predicted to earn a statistically significant 21% higher wage in Wellington than in secondary and minor urban areas in New Zealand. There is also a large wage premium for workers living in Auckland compared with the average location, while wages are lower in Christchurch, other main urban areas and rural areas than they are in the average location. Similar results are found for Australia, with wages for the same hypothetical worker 16–18% higher in Canberra and Sydney than in Adelaide, inner regional areas and rural areas in Australia.² This variation is large enough in both countries that the wage rate predicted for the hypothetical worker in Wellington or Auckland is statistically indistinguishable from what this worker is predicted to earn in Adelaide, inner regional areas and rural areas in Australia.

We further illustrate, in Figure 3, how trans-Tasman differences in average wages vary with education. Again, all other characteristics are fixed to be the same as those for the average non-migrant in New Zealand and approximate 95% confidence intervals are graphed along with predicted wages in the average location in each country. The relative return to years of education (ie, percentage increase in wages) is similar in the two countries, because average wage rates in Australia are higher than those in New Zealand, but differences in real wages in absolute terms are larger for more skilled individuals. For example, an average non-migrant in New Zealand with 9 years of education earns, on average, 17.09 New Zealand dollars per hour in New Zealand and 20.36 New Zealand dollars per hour in Australia. On the other hand, this same individual with 15 years of education earns, on average 26.51 New Zealand dollars per hour in New Zealand and 32.54 New Zealand dollars per hour in Australia. In other words, a low-skilled individual earns \$3.30 per hour higher wages in Australia, which is a 19% wage premium, while a high-skilled individual earns \$6 more per hour in Australia, which is a 23% wage premium.

¹ Urban areas are statistically defined areas with no administrative or legal basis. Main urban areas are very large areas centred on a city or major urban centre and have a minimum population of 30,000. Secondary urban areas have a population of 10,000–29,999 and are centred on the larger regional centres. Minor urban areas are urbanised settlements (outside main and secondary urban areas), centred around smaller towns with a population of 1,000–9,999. The remaining population is in rural centres, which have a population of 300–999, and rural areas

² Locations in Australia are classified by their remoteness based on the physical road distance to the nearest urban centre. Inner regional areas have an index value greater than 0.2 and less than or equal to 2.4 and include towns such as Hobart, Launceston, Noosa and Tamworth.

Figure 3: Predicted wages for an average non-migrant in New Zealand and Australia by years of education



Note: PPP = purchasing power parity

Overall, even though returns to education are similar in Australia and New Zealand and there are large flows of individuals across the Tasman Sea and into each country from abroad, large differences in average wages persist both within and between each country. One potential explanation for this is that local wages are related to local firm productivity and this depends on both the population size of different locations and the distance to larger markets both domestically and abroad. The economic geography literature argues that agglomeration economies lead population size and relative distance to influence economic performance (Rosenthal and Strange 2004). Maré and Graham (2009) examined data on New Zealand firms and found that productivity is higher in more agglomerated areas. This is consistent with the findings reported here on average wage differentials across New Zealand. Previous work by Grimes (2005) showed that Auckland 'looks like' smaller cities in Australia, such as Adelaide, along several dimensions, which is also consistent with our findings.

Wage differentials may also exist because of differences in the quality of amenities in different locations. For example, the gap in average wages between Australia and New Zealand may reflect that cities in New Zealand are less congested than those in Australia and that non-urban areas in New Zealand are generally less remote from main urban areas than those in Australia. Exploring the reasons for the large variation in wage levels found across geographical locations in New Zealand and Australia is left to future research.

4.4 Allowing returns to human capital to vary by country of birth

We next estimate regression models that allow the returns to education and potential experience to differ for workers by immigration status. First, we restrict the returns to be the same for all immigrants in either Australia or New Zealand, but allow them to differ from the returns for non-migrants. The relationship between the other control variables (ie, gender, marital status, household type, geographical location, urbanisation and survey year) and wages is also allowed to differ for immigrants. Additional controls are also included for whether an individual is an immigrant and, if they are, the decade in which they arrived in New Zealand or Australia and a quadratic for the number years that they have lived in either country.¹ Hence, this model is equivalent to estimating separate wage regressions for non-migrants and immigrants and the results for non-migrants will be the same as in Table 2.

Second, we extend this model further by allowing the returns to human capital to vary for immigrants from different countries of birth in Australia and New Zealand. Indicator variables are also included in this model for each country of birth, allowing individuals with the same human capital from different origin countries to have different returns. However, the relationship between other control variables, including immigrant cohort and years in the host country, are assumed to be the same for all immigrants. This restriction does not have a qualitative impact on our results and allows for more precise estimates of the relationship between human capital and wages by country of origin.

As discussed previously, if returns to human capital are higher for a particular migrant group, this strongly suggests that, on average, this group has unobservable characteristics that are associated with having higher wages, such as greater ambition and motivation, than the average native-born worker. On the other hand, if returns to human capital are lower for a particular migrant group this may indicate that these individuals are negatively selected on unobservables, that their human capital is not completely transferable, that they have worse access to informal job networks or that there is labour-market discrimination against these workers. Unfortunately, it is difficult to distinguish between these alternative explanations, although we attempt to examine the extent to which human capital acquired abroad is transferable to Australia and New Zealand in our next analysis.

We report the results from these regressions in Table 4. As the results for non-migrants in each country are the same as those reported in Table 2, we present only the interaction effects for the human capital variables, first when we allow the returns to differ by immigration status (in the first column) and second when we allow the returns to further vary by country of birth (in the remaining columns).

¹ Controlling for migrant arrival cohort and years in Australia or New Zealand does not affect our comparison of returns to human capital for immigrants to non-migrants, but when comparing migrants from different source countries as in our next analysis, controls for compositional differences among successive cohorts of migrants may be important if labour market assimilation occurs slowly.

Table 4: Returns to human capital for individuals from different countries of birth in New Zealand and Australia

County of Birth	All Immigrants	Trans-Tasman	UK	Pacific Islands	China	India	South Africa	South-East Asia	Europe / Americas	Other Asia	Other Foreign
In New Zealand - Relative to the Returns for the New Zealand-born											
Years of Education	0.0170** (0.005)	-0.0434* (0.020)	-0.002 (0.009)	0.014 (0.009)	0.008 (0.015)	0.011 (0.013)	0.0441** (0.015)	0.0285+ (0.016)	0.0274+ (0.014)	0.034 (0.034)	0.022 (0.014)
Years Potential Experience	0.0128** (0.005)	-0.024 (0.016)	0.014 (0.010)	-0.002 (0.008)	0.0300* (0.013)	-0.004 (0.015)	0.010 (0.018)	0.0286* (0.012)	0.022 (0.015)	-0.023 (0.022)	0.007 (0.012)
Years Pot Exp Squared / 100	-0.0259** (0.009)	0.032 (0.032)	-0.031 (0.019)	0.006 (0.014)	-0.0800** (0.028)	0.007 (0.033)	-0.022 (0.040)	-0.0655** (0.024)	-0.039 (0.031)	0.044 (0.056)	-0.014 (0.024)
Marginal Effect at 15 Years Potential Exp	0.005* (0.002)	-0.014+ (0.007)	0.005 (0.005)	-0.001 (0.003)	0.006 (0.006)	-0.002 (0.006)	0.004 (0.007)	0.009+ (0.005)	0.010 (0.007)	-0.009 (0.008)	0.003 (0.006)
Marginal Effect at 25 Years Potential Exp	0.000 (0.001)	-0.008* (0.004)	-0.001 (0.002)	0.001 (0.002)	-0.010* (0.004)	-0.001 (0.004)	-0.001 (0.004)	-0.004 (0.004)	0.002 (0.004)	0.000 (0.009)	0.000 (0.004)
Marginal Effect at 35 Years Potential Exp	-0.005* (0.002)	-0.001 (0.007)	-0.007+ (0.004)	0.002 (0.003)	-0.026** (0.008)	0.000 (0.009)	-0.005 (0.011)	-0.017* (0.007)	-0.005 (0.008)	0.008 (0.019)	-0.003 (0.006)
In Australia - Relative to the Returns for the Australian-born											
Years of Education	0.000 (0.006)	-0.012 (0.017)	0.012 (0.009)	-0.017 (0.021)	0.049 (0.031)	-0.005 (0.028)	0.025 (0.037)	-0.010 (0.015)	0.007 (0.010)	-0.043 (0.035)	0.008 (0.022)
Years Potential Experience	-0.0131* (0.006)	-0.009 (0.017)	-0.013 (0.013)	0.0788** (0.025)	-0.018 (0.030)	0.004 (0.028)	0.022 (0.031)	-0.0410** (0.014)	-0.010 (0.010)	0.007 (0.026)	-0.0568** (0.022)
Years Pot Exp Squared / 100	0.0225+ (0.012)	0.005 (0.034)	0.026 (0.024)	-0.184** (0.057)	0.026 (0.063)	-0.017 (0.062)	-0.053 (0.068)	0.0777** (0.029)	0.024 (0.020)	-0.036 (0.064)	0.106* (0.044)
Marginal Effect at 15 Years Potential Exp	-0.006* (0.003)	-0.007 (0.007)	-0.005 (0.006)	0.024** (0.009)	-0.010 (0.012)	-0.001 (0.011)	0.006 (0.012)	-0.018** (0.005)	-0.003 (0.004)	-0.004 (0.009)	-0.025** (0.010)
Marginal Effect at 25 Years Potential Exp	-0.002 (0.001)	-0.006+ (0.003)	0.000 (0.003)	-0.013* (0.006)	-0.005 (0.007)	-0.004 (0.008)	-0.004 (0.006)	-0.002 (0.003)	0.002 (0.002)	-0.011 (0.009)	-0.004 (0.006)
Marginal Effect at 35 Years Potential Exp	0.003 (0.003)	-0.005 (0.008)	0.006 (0.005)	-0.050** (0.016)	0.001 (0.016)	-0.008 (0.018)	-0.015 (0.018)	0.013+ (0.008)	0.007 (0.005)	-0.018 (0.020)	0.017 (0.012)

** p<0.01, * p<0.05, + p<0.1. Robust standard errors in parentheses that account for repeated observations for individuals over time in Australia and survey clustering in New Zealand. All control variables presented in Table 2 are included in each regression, as well as controls for the geographical region and urbanisation of the household and, for each immigrant, their 10 year arrival cohort and a quadratic in years since arrival. The relationship between all covariates and wages are allowed to differ for immigrants and non-immigrants. Starting in the second column, returns to human capital are also allowed to further vary by county of birth.

Examining the results from the first model for immigrants in New Zealand, we find that the return to human capital is higher for immigrants than non-migrants. For example, for each additional year of education, an immigrant worker in New Zealand earns, on average, an additional 1.7% more per hour than an equivalent New Zealand-born worker. Similarly, for each additional year of potential experience, an immigrant worker in New Zealand with 15 years of experience earns, on average, an additional 0.5% per hour.¹ This strongly suggests that immigrants to New Zealand are, on average, positively selected on unobservables. In other words, they are more motivated and ambitious than New Zealand-born workers with the same observable characteristics.

Examining the corresponding results for immigrants in Australia, we find that the return to education is the same for immigrants and the Australian-born while the return to potential experience is lower for immigrants. In fact, the return to experience for immigrants is about half that for Australian-born workers; at 15 years of experience, an immigrant worker earns, on average, 0.6% less for each year of experience than the equivalent Australian-born worker. This is consistent with either immigrants being negatively selected on unobservables compared with the Australian-born or there being other reasons, such as poor transferability of human capital or discrimination, that lead to lower returns to skill than those found for the Australian-born.

Turning to the results that allow the returns to human capital to vary by country of birth, we find that returns vary widely across immigrant groups in both Australia and New Zealand. This is consistent with Borjas' (1987) evidence for the US labour market. Many of the coefficients are imprecisely estimated because of small sample sizes, but we can make general conclusions. Returns to education in New Zealand are particularly high for immigrants from South Africa. They are also above the returns for the New Zealand-born for immigrants from South-East Asia and Europe and the Americas. Only among immigrants from Australia are returns to education lower than for the New Zealand-born. In fact, even though the Australian-born in New Zealand are more educated than the average New Zealand-born in New Zealand, they earn less than half the return on an extra year of education. This strongly suggests that trans-Tasman migrants from Australia are negatively selected on unobservables relative to the New Zealand-born.

Turning to Australia, returns to education are particularly high for immigrants from South Africa and China, while they are particularly low for immigrants from Other Asia. However, all of the results are imprecisely estimated. There is also some evidence that returns to work experience are much lower for immigrants from South-East Asia and Other countries than for the Australian-born, while they are larger for the Pacific Island-born with 15 years of potential experience, but smaller for Pacific Island-born with 25 or more years of potential experience. The returns to human capital for the New Zealand-born in Australia are statistically indistinguishable from the Australian-born in Australia. Therefore, we

¹ Returns to experience are similar for the New Zealand-born and immigrants who have 25 years of experience and higher for the New Zealand-born who have 35 years of experience. This result is potentially sensitive to the functional form used in the regression model (ie, a quadratic in potential experience).

find no evidence that New Zealand-born trans-Tasman migrants have different unobservable characteristics than the Australian-born in Australia.

4.5 Predicted wages for different immigrants in New Zealand and Australia

We next use the regression results estimated in the previous section to calculate the predicted wages for individuals with different immigration status but otherwise identical characteristics in New Zealand and Australia. This allows us to quantify the extent to which average wages vary for immigrants from different countries. Table 5 presents predicted wages calculated using the characteristics of the average immigrant in either New Zealand or Australia and the appropriate settings for the control variables for each country of birth. Thus, for New Zealand, comparisons are between non-migrants and immigrants who have been in New Zealand for 19 years, and for Australia, the comparison is between non-migrant and immigrants who have been in Australia for 25 years. For all comparisons across different immigrant groups in the same country, years in the host country is fixed to this same value.

Table 5: Predicted wages for individuals from different countries of birth in New Zealand and Australia

Country of Birth	Mean Wage (Local \$)	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Compare to Within Country Non-Immigrants
In New Zealand				
New Zealand	23.52	23.11	23.93	
All Immigrants	21.25	20.66	21.86	-10.1% *
Australia	22.17	20.51	23.97	-5.9%
UK	25.16	24.10	26.26	6.7% *
Pacific Islands	19.21	18.32	20.13	-20.2% *
China	17.56	16.04	19.22	-29.2% *
India	19.52	18.11	21.04	-18.6% *
South Africa	23.46	21.90	25.12	-0.3%
South-East Asia	19.60	18.19	21.12	-18.2% *
Europe / Americas	22.76	21.51	24.09	-3.3%
Other Asia	16.91	14.52	19.71	-33.0% *
Other Foreign	21.20	19.92	22.56	-10.4% *
In Australia				
Australia	26.39	26.00	26.78	
All Immigrants	25.14	24.44	25.85	-4.9% *
New Zealand	26.54	24.77	28.43	0.6%
UK	26.51	25.32	27.76	0.5%
Pacific Islands	21.71	19.56	24.10	-19.5% *
China	20.39	17.98	23.13	-25.8% *
India	23.84	20.22	28.10	-10.2%
South Africa	24.70	21.45	28.44	-6.6%
South-East Asia	23.33	21.97	24.78	-12.3% *
Europe / Americas	25.18	24.02	26.40	-4.7%
Other Asia	23.32	19.79	27.47	-12.4%
Other Foreign	24.85	22.38	27.59	-6.0%

Amounts are in either 2008 NZ or AU dollars. Figures are predicted values from the regressions results presented in Table 4 using the characteristics of the average immigrant in either New Zealand or Australia and the appropriate settings for the control variables for the each country of birth. Mean log values and confidence intervals are then converted to levels, hence these figures are geometric means. Differences that are significant at the 5% level are followed by a *.

Wages are in local currency in both countries and cross-country comparisons are not meaningful because the composition of immigrants is different in each country. However, the results in Table 5 allow us to examine the extent to which the unobserved characteristics of individuals, such as their motivation, differ by country of origin within Australia and New Zealand. It is again worth noting that these results may also reflect differences in the transferability of human capital, the quality of job networks or the amount of discrimination experienced by individuals from different backgrounds.

First, the results for New Zealand show that although immigrants in New Zealand have more human capital and earn higher returns on it than the New Zealand-born, an average immigrant earns 10.1% less than an equivalent New Zealand-born worker. This suggests other factors are at play, such as discrimination or lower quality job networks, that influence wage levels rather than the returns to human capital. Examining the variation across countries, only workers born in the UK with the characteristics of the average immigrant earn more, on average, than similarly skilled New Zealand-born workers. On the other hand, a worker born in the Pacific Islands, India or South-East Asia with the characteristics of an overall average immigrant earns 18–20% less than those born in New Zealand with the same skills, and those born in China and Other Asia earn approximately 29–33% less.

In the first panel of Figure 4, we examine how the difference in average wage for non-migrants and immigrants in New Zealand varies with education. All other characteristics are still fixed to be the same as those for the average immigrant in New Zealand and approximate 95% confidence intervals are graphed along with predicted wages. Because returns to education are higher for immigrants than for non-migrant New Zealanders, the average migrant wage gap declines in size with education. For example, focusing on just relative differences, an average immigrant with 9 years of education earns 15% less than an average non-migrant New Zealander with exactly the same characteristics, while an average immigrant with 15 years of education earns 5.9% less than a similar non-migrant. At the highest education level observed in our data (equivalent to 17.5 years of education), the wage gap is only 1.8% and is statistically indistinguishable from zero. However, the gap is still a sizeable 7.5% at 14 years of education.

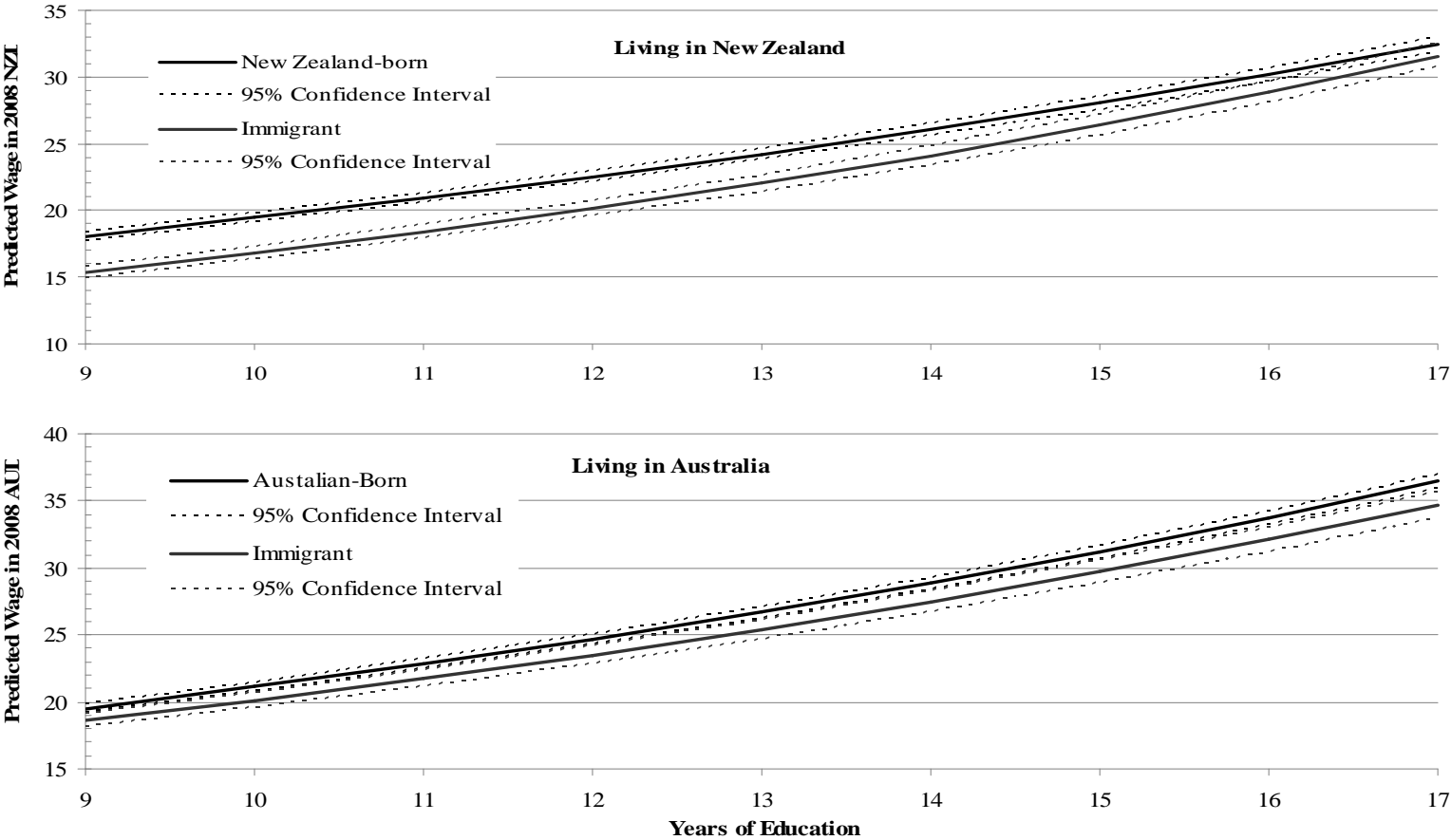
Taken in conjunction with the information on observable skills in Table 1 and differential returns to skill in Table 4, these results suggests that migrants from the UK and South Africa to New Zealand are positively selected on both observed skills and unobservables that lead to higher wages conditional on human capital. On the other hand, the finding that immigrants from the Pacific Islands, India, China, South-East Asia and Other Asia earn significantly less than equivalent New Zealand-born workers, although returns to education are similar for these individuals, suggests that factors other than unobservable characteristics, such as poor job networks or labour market discrimination, have an important influence on wages for these workers.

Returning to Table 5, we see that the average immigrant in Australia earns 4.9% less than an Australian-born individual with the same characteristics. As in New Zealand, this difference is likely to reflect the existence of factors such as discrimination or lower quality job networks that influence wage levels rather

than the returns to human capital. Among individuals from different countries of birth but with otherwise the same characteristics, none is predicted to earn more than Australian-born workers. However, New Zealand-born and UK-born workers are estimated to earn the same as equivalent Australian-born workers. On the other hand, average immigrants born in South-East Asia are estimated to earn 12.3% less than an equivalent Australian-born worker, those born in the Pacific Islands 19.5% less, and those born in China 25.8% less. Interestingly, these patterns are quite similar to those found for New Zealand, suggesting that similar factors exist in both labour markets that lead to lower average wages for workers born in the Pacific Islands and Asia compared with those born elsewhere.

In the second panel of Figure 4, we examine how the difference in average wage for non-migrants and immigrants in Australia varies with education. All other characteristics are still fixed to be the same as those for the average immigrant in Australia. Because returns to education are the same for immigrants as for non-migrant Australians, the average migrant wage gap in relative terms is independent of years of education. Even in absolute terms, there is little variation with the wage gap \$0.92 for immigrants with 9 years of education in Australia compared with \$1.50 for immigrants with 15 years of education.

Figure 4: Predicted wages by migrant status in New Zealand and Australia by years of education



Note: AUD = Australian dollar; NZD = New Zealand dollar

4.6 International transferability of human capital

In our final analysis, we examine whether the returns to education acquired overseas differ from the returns to domestically acquired education. This may occur because of actual or perceived differences in the quality and relevance of overseas education. This analysis is undertaken by re-estimating the regression models presented in Table 4 but splitting education into that acquired abroad and that acquired domestically. Because some individuals born in New Zealand and Australia have done their studies abroad, we can even estimate these regression models for non-migrants. Unfortunately, since we can separate only domestic experience from foreign experience using the information on how long an immigrant has been living in either Australia or New Zealand, we are not able to estimate whether the returns differ for foreign compared with domestic work experience (ie, these variables would be collinear to our control variable for years in the host country).

The results from this analysis are presented in Table 6. We present only results from models where we assume that the returns to human capital are the same for all immigrants in each country, but generally find similar findings for migrants from different countries of birth. Besides allowing for different returns to domestic and foreign years of education, the models estimated here are identical to those presented in Table 4, but now we present the full results for non-migrants and immigrants separately.

In general, we find that education acquired abroad is rewarded the same in the New Zealand and Australian labour markets as education acquired domestically. In fact, the only difference we find is that the return to a year of foreign education is 1% lower than the return to a year of domestic education for the New Zealand-born living in New Zealand. This likely reflects the unobserved characteristics of the small subset of New Zealand-born individuals who have foreign school qualifications (the only type of foreign education that can be identified for these individuals in the NZIS).

Table 6: Returns to domestic compared with foreign acquired human capital in New Zealand and Australia

	New Zealand-born in New Zealand	Immigrants in New Zealand	Australian-born in Australia	Immigrants in Australia
Years of Education	0.0735** (0.002)	0.0904** (0.005)	0.0781** (0.003)	0.0773** (0.005)
Foreign Education Relative to Domestic	-0.0103* (0.004)	0.000 (0.003)	-0.001 (0.006)	0.001 (0.003)
Years Potential Experience	0.0220** (0.002)	0.0348** (0.005)	0.0197** (0.002)	0.006 (0.006)
Years Pot Exp Squared / 100	-0.0364** (0.004)	-0.0620** (0.009)	-0.0284** (0.005)	-0.006 (0.011)
Marginal Effect at 15 Years Potential Experience	0.011** (0.001)	0.016** (0.002)	0.011** (0.001)	0.004 (0.003)
Marginal Effect at 25 Years Potential Experience	0.004** (0.000)	0.004** (0.002)	0.005** (0.001)	0.003+ (0.002)
Marginal Effect at 35 Years Potential Experience	-0.004** (0.001)	-0.009** (0.002)	0.000 (0.001)	0.002 (0.003)
R-squared	0.190	0.219	0.187	0.177
Observations	15,634	3,578	12,954	3,366

** p<0.01, * p<0.05, + p<0.1. Separate regressions are estimates for each country of birth and location. Robust standard errors in parentheses that account for repeated observations for individuals over time in Australia and survey clustering in New Zealand. All control variables presented in Table 2 are included in each regression, as well as controls for the geographical region and urbanisation of the household, and for immigrant groups, controls for arrival cohorts and years since arrival.

5 CONCLUSIONS

In this paper, we use parallel data from the NZIS and the HILDA to examine how the returns to human capital differ for immigrant, Australian-born and New Zealand-born workers residing in New Zealand and Australia. We then use this information along with other descriptive evidence to identify whether particular groups are likely to be positively or negatively selected on both observable (eg, more or less skilled) and unobservable (eg, more or less motivated) characteristics. Four interesting findings emerge.

First, looking at the distribution of observable human capital, we find that the Australian-born living in Australia have, on average, the same level of education as the New Zealand-born living in New Zealand and as the New Zealand-born living in Australia. Hence, the anecdotal evidence that Australia, on average, attracts high-skilled New Zealanders does not seem to be true. However, the Australian-born living in New Zealand are more educated than those living in Australia. Comparing immigrant populations in New Zealand and Australia shows that migrants from the UK, South Africa, and Europe and the Americas living in New Zealand are relatively more skilled than individuals from these countries living in Australia, while the opposite is true for the remaining, mainly Asian, countries.

Second, the overall returns to human capital for non-migrants are similar on both sides of the Tasman, with an additional year of education leading to 8% higher wages and an additional year of experience leading to 1.1% higher wages for a young worker, 0.4–0.5% higher wages for a middle-aged worker and zero to 0.3% lower wages for an older worker. However, average wages adjusted for differential costs of living are 19% higher in the average location in Australia for a worker with the characteristics of an average New Zealand-born individual in New Zealand than for an identical worker in the average location in New Zealand. It is worth noting that, for this same worker, wages in the high-wage New Zealand locations of Wellington and Auckland would be as high as those in the low-wage Australian locations of Adelaide, inner regional areas and rural areas.

Third, among individuals living in New Zealand, only workers born in the UK earn more, on average, than similarly skilled New Zealand-born. On the other hand, workers born in India, South-East Asia, the Pacific Islands, Other Asia (mainly Japan and Korea) and China earn significantly less than comparable New Zealand-born workers. Returns to education in New Zealand are particularly high for immigrants from Europe and the Americas, South-East Asia and South Africa. Only among immigrants from Australia are returns to education lower than for the New Zealand-born. Overall, these results suggest there is positive selection on both observables and unobservables for immigrants from South Africa, the UK and Europe and the Americas, while the Australian-born appear to be negatively selected on unobservables even though they have higher levels of education than the New Zealand-born. On the other hand, the finding for immigrants from the Pacific Islands, India, China, South-East Asia and Other Asia suggests factors other than unobservable characteristics, such as poor job networks or labour market discrimination, have an important influence on wages for these workers.

Fourth, among individuals living in Australia, no group of immigrant workers earns more than the Australian-born, with New Zealand-born and UK-born workers earning about the same. On the other hand, average immigrants born in South-East Asia, the Pacific Islands and China all earn significant less than equivalent Australian-born workers. This is true even though the returns to education are generally the same for immigrants and non-migrants in Australia. Interestingly, these patterns are similar to those found for New Zealand, suggesting similar factors exist in both labour markets that lead to lower average wages for workers born in the Pacific Islands and Asia compared with those born elsewhere.

Overall, we find little evidence of a trans-Tasman brain drain from New Zealand. In fact, New Zealanders living in Australia generally have the same characteristics as those remaining in New Zealand and receive the same returns to their human capital. One interesting question for future research is why, given the sizeable gap in average wages between the high-wage Australian areas of Canberra, Sydney, Melbourne and Perth and even the high-wage areas of New Zealand, more New Zealanders do not move to Australia. One possible reason is that differences in living expenses and taxes between these locations are not captured using the overall PPP exchange rate. Another possible reason is that better amenities and a higher quality of life in New Zealand compensate for wage differences. Supporting this hypothesis, Australians in New Zealand are more skilled than Australians in Australia even though average wages and returns to human capital for these workers are much lower in New Zealand than for the average New Zealander.

REFERENCES

- Bedford, Richard, Robert Didham and Lynda Sanderson. 2006. 'Population movement within diaspora: Kiwis in Australia.' Presentation made at the 29th Australia – New Zealand Population Workshop, Christchurch, 25–27 October.
- Borjas, George J. 1987. 'Self-selection and the earnings of immigrants.' *American Economic Review* 77(4): 531–553.
- BusinessNZ. 2003. 'New immigration policy tackles skill shortages.' 1 July. Available at <http://www.businessnz.org.nz/doc/526/Newimmigrationpolicytacklesskillshortages>.
- Chiquiar, Daniel, and Gordon H Hanson. 2005. 'International migration, self-selection, and the distribution of wages: Evidence from Mexico and the United States.' *Journal of Political Economy* 113(2): 239–281.
- Clemens, Michael, Claudio E Montenegro and Lant Pritchett. 2008. *The Place Premium: Wage Differences for Identical Workers across the US Border*. Working Paper 148. Center for Global Development.
- Collins, Simon. 2005. 'Quarter of NZ's brightest are gone.' *New Zealand Herald* 12 March. Available at http://www.nzherald.co.nz/topic/story.cfm?c_id=209&objectid=10114923.
- Grimes, Arthur. 2005. 'New Zealand: A typical Australasian economy?' in Andrew Ladley and John Martin (eds) *The Visible Hand: The Changing Role of the State in New Zealand*. Wellington: Institute of Policy Studies, pp 17–42.
- Hugo, Graeme. 2004. 'New Zealanders in Australia.' *New Zealand Population Review* 30(1&2): 61–92.
- Maré, David C, and Daniel J Graham. 2009. *Agglomeration Elasticities in New Zealand*. Working Paper 09-06 (June). Wellington: Motu.
- McKenzie, David, John Gibson and Steven Stillman. Forthcoming. 'How important is selection? Experimental vs non-experimental measures of the income gains from migration.' *Journal of the European Economic Association*.
- Mincer, Jacob. 1974. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research.
- New Zealand Press Association. 2008a. 'Exodus across Tasman hits record.' 19 December. Available at <http://stuff.co.nz/4798318a13.html>.
- New Zealand Press Association. 2008b. 'Kiwis crossing ditch nears 20-year high.' 4 February. Available at <http://stuff.co.nz/4386918a10.html>.
- New Zealand Press Association. 2008c. 'Migrant outflow to Aust at 19-year high.' 21 July. Available at <http://stuff.co.nz/4625823a13.html>.
- New Zealand Press Association. 2008d. 'NZ "giant transit lounge" for migrants to Oz.' 28 February. Available at <http://stuff.co.nz/4419516a10.html>.

- Robinson, Chris, and Nigel Tomes. 1982. 'Self-selection and inter-provincial migration in Canada.' *Canadian Journal of Economics* 15(3): 474–502.
- Rosenthal, Stuart, and William Strange. 2004. 'Evidence on the nature and sources of agglomeration economies' in Vernon J Henderson and J F Thisse (eds) *Handbook of Regional and Urban Economics*, Vol 4. Amsterdam: North-Holland.
- Wooden, Mark, Simon Freidin and Nicole Watson. 2002. 'The Household Income and Labour Dynamics in Australia (HILDA) Survey: Wave 1' *Australian Economic Review* 35(3): 339–348.

