

# Occupational Attainment and Earnings among Immigrant Groups: Evidence from New Zealand

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## Abstract

*This paper concerns the prediction of career success among migrants. We focus specifically on the role of occupation as a mediating variable between the predictor variables education and time since migration, and the dependent variable career success as denoted by occupational status, linked to earnings. Following a review of the literature specifically focused on occupation, we apply Ordered Probit analysis to a sample of over 37,900 employed males surveyed in New Zealand. New Zealand provides an interesting case, as a country where migrants from diverse ethnic groups comprise a significant part of the population. We focus on the occupational attainment of immigrants and the native-born populations and provide evidence on the mediating effect of occupational attainment on earnings. Our analyses show the interplay of factors leading to occupational attainment: for example, education level is of greatest importance, and much of its effect on earnings is through occupational attainment; different immigrant groups have differentiable outcomes, and years of experience in the host country enable gradual occupational advancement. This is the first application of this analysis to New Zealand data. Our results highlight the significant mediating role of occupational attainment in explaining earnings across immigrant and native-born groups.*

Keywords: Occupational attainment, earnings, immigrants, ethnic group

JEL classification: J30, J31

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## 1. Introduction

A large and increasing proportion of the world's population, particularly those living in developed countries, are nowadays migrants, i.e. resident in a country other than the one they were born in: an estimated 214 million people, or nearly 3.1 per cent of the world's population (IOM, 2012).

Globally, countries and organizations have become involved in attracting skills (OECD, 2002). An increasing number of countries rely on immigrants as part of their human resources and economic growth strategies. Among English-speaking countries, immigrants have played and continue to play an important role in the USA, Canada, Australia and New Zealand. An important expectation in the immigration policies of these countries is an economic assimilation (integration) model in which immigrants enjoy similar economic and social benefits as the rest of the population. The economic assimilation hypothesis broadly refers to the idea that while immigrants may initially be disadvantaged either due to characteristics that distinguish them from the mainstream population such as in language proficiency, or due to fewer opportunities and lack of networks, over time they adopt characteristics that lead to economic integration, making them comparable to the native-born population in economic terms.

A number of studies have verified that immigrants may initially experience lower earnings compared to the native-born population (e.g. Chiswick, 1978; Borjas, 1985; Orrenius and Zavodny, 2007; Amuedo-Dorantes and De La Rica, 2007; Chiswick and Miller, 2008b; and Elliott and Lindley, 2008). According to Orrenius and Zavodny (2007) high-skilled immigrants to the US suffer a larger earnings penalty than do less-skilled immigrants. This effect has also been verified for New Zealand (Winkelmann and Winkelmann, 1998; and Stillman and Maré, 2009).

Migrants typically migrate with specific labour resources. In seeking jobs in the host country they may have advantages such as educational qualifications, work experience, bilingualism, high motivation, and lower expectations in respect of wages. Countering these, however, are initial potential disadvantages such as less language proficiency and non-recognition of foreign qualifications and experience; and deficits in host country labour market information, firm-specific training, and social networks (Chiswick, 1978). In addition, immigrants may typically experience disruption to their careers.

One of the important indicators of immigrant economic integration in their host country is the degree to which their occupational attainment reaches levels that match those of the rest of the population. In addition, since education and skills are generally the most significant assets that immigrants bring with them, the degree to which their education leads to occupational attainment in the host country is a key factor of interest.

In spite of the importance of this effect, relatively few economics studies to date have examined the role of occupational attainment of immigrants in explaining their economic success, in terms of both economic opportunity and access, and as a pathway to higher earnings. However, it is increasingly recognised that the information on the occupational distribution of immigrants in a host country is central

to understanding how immigrants affect economic growth and how they adjust to the host country (Green, 1999; Orrenius and Zavodny, 2007; Elliott and Lindley, 2008; Chiswick and Miller, 2009a, 2009b; Orrenius and Zavodny, 2007).<sup>1</sup>

In this paper we examine the occupational attainment of immigrants in New Zealand, a major immigrant-receiving country, and the link between occupational attainment and earnings. We use micro-data pooled across six years for a large random sample consisting of immigrants and native-born populations to examine the relative chances of immigrants to be engaged in higher-level occupations.

The main objective of our analyses in this paper is to examine the mediating effect of occupational attainment on the earnings of immigrants relative to the native-born population. Following the approach in Chiswick and Miller (2008a, and 2009a) in our analysis, we first examine the relative chances of immigrants being engaged in higher-level occupations, after controlling for education, years of experience and years of residence in the host country. We also consider effects relative to the native population. To the data we apply an Ordered Probit modelling approach (Aitchison and Silvey, 1957) to examine the effect of human capital variables on occupational attainment and earnings, and we incorporate the hierarchical nature of occupational attainment in the analysis. We augment our analysis through additional multinomial-logit estimations.

We then verify the effect of occupational attainment on earnings. For this analysis, we first estimate standard earnings models based on the main human capital variables widely used in economics and related fields (based on semi-logarithmic multivariable regression analyses). We then augment our earnings models by adding each person's occupational category of employment. Thus a comparison of our models, with and without occupation of employment, can verify and quantify the extent to which occupational attainment contributes to the relative earnings of immigrant groups.

The context for our research is New Zealand, an immigrant-receiving country, and a nation of immigrants. According to the 2013 Census immigrants made up 25.2 per cent of the total population (over six times the world average).<sup>2</sup> Attitudes toward immigrants in New Zealand are generally positive (Ward and Masgoret, 2008). There appear to be outcome differences between immigrant ethnic groups, but educational qualifications also vary across these groups, and these comparative measures do not control for education and skills.

New Zealand's general history and its immigration history are closely related. In its very earliest years, Maori immigrants settled in New Zealand. In the nineteenth century, large numbers of European immigrants arrived. In recent decades, New Zealand has become a country with multiple ethnicities and cultural backgrounds. Immigration has generally become the greater mechanism for population growth in New Zealand. Both immigrants with high technical and academic qualifications and immigrants with the ability to establish business or financial investments are welcomed, to contribute to the 10,000 annual population growth net goal of New Zealand.

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<sup>1</sup> An earlier literature on occupational attainment in general, and not specific to immigrants, includes, for example, studies by Duncan (1961), Schmidt and Strauss (1975), Solomon (1981), Nickell (1982), and Grossman (1984).

<sup>2</sup> Immigrants comprised 23 per cent of the New Zealand population in the 2006 Census (and 19 per cent of the population in the 2001 Census).

New Zealand immigration policy is principally focussed on skilled migration. Since the immigration policy reform of 1987 and its extensions in 1991, the 'points system' which rewards educational qualifications, work experience and younger working age adults is a major feature of New Zealand immigration policy. For example, 59 per cent of permanent resident visas granted in 2007 were based on the skilled migration/business category.<sup>3</sup>

Among immigrants the largest group has traditionally been from (a) European background (Europe, South Africa and North America). Other substantial groups of migrants are from (b) Asia, particularly China, Honk Kong, Taiwan, South Korea and India; and (c) the Pacific Islands, especially Samoa, Tonga, and the Cook Islands.<sup>4</sup> This feature of New Zealand data allows us to examine the effects of interest across immigrant groups from diverse country of origin groups.

A high proportion of recent immigrants from the Pacific Islands and Asia tend to work in 'elementary' occupations compared to the immigrants from a European background (Ward and Masgoret, 2008). This general analysis highlights differences across immigrant groups by ethnic group, but average educational qualifications also vary across immigrant ethnic groups, and the above comparative measures do not control for education and skills.

In the analytical section of our paper we show the determinants of occupational attainment and the mitigating effect of occupation on earnings. We incorporate disaggregated data and account for education, experience and skill. We further show evidence on ethnic occupational attainment for controlled educational groups.

We examine the relative occupational attainment and earnings of three important immigrant groups in New Zealand: from European backgrounds, Pacific Island backgrounds, and the group consisting mainly of Asian immigrants. Immigrant enclaves vary in available resources and established networks, and even years after immigration there are marked differences across immigrant ethnic groups in earnings and employment in certain occupations associated with higher earnings. We examine the relative chances of these immigrant groups to be engaged in higher-level occupations, based on controlled analyses that account for education, years of experience and years of residence in the host country.

This is the first application of occupational attainment analysis for immigrants, with impacts on earnings, based on the Chiswick and Miller (2009) method to New Zealand data. We also extend the international literature by examining effects across immigrant ethnic groups.

The plan of this paper is as follows. In section 2 we provide a review of the main questions and findings of the economics literature on occupational attainment. In section 3 we discuss our data and methodology. In section 4 we discuss our analytical methods and findings on occupational attainment, and earnings. In section 5 we present our conclusions.

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<sup>3</sup> The family reunion category contributed to 32 per cent of permanent resident visas, and the humanitarian category contributed to the remaining nine per cent in 2007 (Source: New Zealand Ministry of Business, Innovation, and Employment, Migration Trends (<http://dol.govt.nz/research/migration>)).

<sup>4</sup> In the 2013 Census of the resident New Zealand Population, 35.7 per cent of immigrants were born in the United Kingdom and Ireland, Australia, U.S. and South Africa accounted for. Those born in China, India, South Korea, and Philippines accounted for 24.7 per cent of immigrants. Immigrants born in Samoa and Fiji accounted for 10 per cent of the immigrant population.

## 2. Review of the Literature and Hypotheses

### *Occupational Attainment*

According to Green (1999), knowing the occupational distribution of immigrants and its changes over time is the key to understanding immigrants' social and economic adjustment to a host country. To determine whether immigrants facilitated growth in Canada in the 1980s by filling gaps in occupational structures, Green used a multinomial logit model of occupational distribution, estimated separately for immigrant and native-born census samples. The multinomial logit model allows estimation of the effects of various personal characteristics on individuals' occupational status as professionals (including managers), white collar, blue collar, or people who did not work. To explain outcomes he used variables such as education, age, country of origin, location, entrance cohorts, and language proficiency. He applied the model to natives and immigrants in Canada at the 1981, 1986 and 1991 censuses. He compared immigrants and native-born at each census, tested changes in both groups' occupational distribution over time, and estimated the economic assimilation effects.

Green's results indicated that immigrants were over-represented in professional and blue-collar occupations and under-represented in white-collar occupations. Comparisons of occupational distributions across censuses for immigrants and natives indicated greater mobility among immigrants, and reflected assimilation to the host country. Moreover, the logit estimates suggested that immigrant adjustment and professional status were related to immigrants' education, skills, and independence.

An important indicator of immigrants' access to opportunities is their level of occupational attainment relative to the native population, and we make this variable key in the present paper. Since education and skills are generally immigrants' most significant assets, the degree to which their education leads to occupational attainment is the focus of this paper. Few studies have examined the relationship of immigrants' occupational attainment to their economic success. However, it is increasingly recognised that the occupational distribution of immigrants and its changes over time are central to understanding immigrants' adjustment and social development (Green, 1999; Orrenius and Zavodny, 2007; Elliott and Lindley, 2008; Chiswick and Miller, 2009b).

Chiswick and Miller (2009a) highlighted that previous research failed to fully understand the 'catch-up' effect of immigrants' labour market adjustment, and argued that insights into such adjustment can be gained from earnings equations that take account of occupational status. They used the US Census to examine the determinants of occupational attainment and the impact of occupation on immigrant earnings. They characterised the desirability of occupations by their earnings, employing in the ordinary least squares analysis a continuous quantitative measure of occupation. They estimated typical human capital earning functions for immigrants both with and without occupational variables as predictors, relating the natural logarithm of annual earnings to educational attainment, potential labour market experience, the natural log of weeks worked, foreign birth, ethnicity, marital status, location, and veteran status.

On this basis, Chiswick and Miller (2009a) found that most of the increase in migrants' earnings associated with education resulted from access to higher-paying occupations. For a given level of education, there was a negative relationship between occupational attainment and pre-immigration work experience, which suggests that

for occupational attainment, and with education controlled for, it is better to have immigrated upon leaving school than to have foreign labour market experience.

Our study enables us to go beyond the work of Chiswick and Miller (2008a, 2009a) in the following ways:

1. We extend data over a wider time-span during which employment outcomes may be affected;
2. We examine effects in New Zealand, which has immigration policies which favour skill as a criterion and may therefore be a model for others who may adopt such policies in the future. This is the first application of the occupational attainment and earnings effects model above to New Zealand data;
3. We differentiate effects by immigrant ethnic groups.

***Hypothesis 1:***

Occupational attainment substantially affects earnings, especially for immigrants. We seek to quantify such effects.

***Hypothesis 2:***

Human capital factors of educational qualifications, years of general work experience, and years in the host country influence occupational attainment. We seek to quantify such effects for immigrants.

***Hypothesis 3:***

The effect of human capital variables on earnings is partially through occupational attainment. We seek to quantify such effects.

While our interest in these hypotheses is in the occupational attainment and economic success of immigrants, we report parallel results for native-born individuals, and where appropriate, we draw attention to differences.

***Variables of Interest***

***Education***

Educational attainment is a primary determinant of immigrants' socioeconomic status (Becker, 1993), and has both direct and indirect impacts on earnings, with the indirect impacts operating, we suggest, through occupational attainment (Chiswick and Miller, 2009a). Educational attainment reflects prior learning and creates the expectation of a more skilled occupation or easier access to jobs. Chiswick and Miller (2009b) found that most of the increase in earnings associated with education comes through access to higher-paying occupations, but that immigrants' payoff for educational qualifications is generally less than that obtained by natives. Lalonde and Topel (1997) indicated that the value of education abroad is always less than that of education in the host country.

### ***Experience***

Labour market experience includes both pre- and post-migration experience. As with educational qualifications, pre-migration experiences appear relatively difficult to transfer to host country labour markets (Chiswick, 1978). However, Chiswick and Miller (2009a) observe that once occupation is taken account of, the payoff to pre-immigration labour market experience rises: thus, pre-migration labour market experience has a negative impact on occupational status, especially among those who seek to enter high-paying occupations.

### ***Years since migration***

Labour market experience gained post-immigration has a positive and more significant effect on occupational attainment (Chiswick and Miller, 2009b). Longer residence enables immigrants to assimilate more deeply, and to advance occupationally, in the host country. However, for higher-paid and more professional occupations, which require more complex skills that might not be accumulated in longer host-country residency, the influence of duration of residence may be less. Moreover, Duleep and Regets (1997) indicate that the greatest post-arrival gains in relative earnings are recorded by immigrants with low earnings at arrival, because they make greater destination-specific investments in human capital.

### ***Ethnicity***

Blackaby, Leslie, Murphy and O'Leary (1998) demonstrated an earnings disadvantage of non-European immigrants in the U.K. that remains unexplained after controlling for an extended number of human capital factors, a result supported by Blackaby, Carlin and Murphy (2007), and by Chiswick (1978) in the U.S. Elliott and Lindley (2008), in a U.S. study, also found immigrant ethnic minorities were disadvantaged in gaining employment in higher-paying occupations.

Other research focuses on how immigrant ethnic enclaves can provide labour market information and access to jobs (Borjas, 1992; Wang and Maani, 2014). These studies highlight the added role of immigrant group resources, information and networks (ethnic capital) on facilitating immigration group economic success in the host country. Both groups of studies (focusing on employer behaviour and ethnic group resources) indicate the existence of differential labour market effects for immigrants of differing ethnicities. However, the second group of studies highlights the positive (or negative) impact of group resources (or lack of them) on ethnic group economic outcomes.

### ***Marital status***

Other variables predicting immigrant occupational attainment are marital status and family circumstances (number of young children). Differences in these variables are important, and measures of these variables were available to us in our study. In particular, in home countries where gender roles are more distinct, influences may persist post-migration, resulting in differential occupational and earnings effects of marital status across immigrant groups. (Grossman, 1984; Blau, Kahn, Liu and Papps, 2013).

### 3. Data

We use individual-level data from the Household Labour Force Survey conducted by Statistics New Zealand, from the June quarter of each year, pooled across six years, 2002 to 2007. The Household Labour Force Survey and its annual supplement, the New Zealand Income Survey, provide information on the labour force experience and earnings of a representative sample of approximately 30,000 individuals collected each year. We select all employed males aged 24-65. The resulting sample of males in our expanded models based on available data on all variables is 37,949 observations. The combined data sets provide disaggregated information on immigrant or native-born status, education, occupation of employment, marital status, number of young children, and, for immigrants, number of years since migration.

In this paper we focus on the age group 24 to 65 years. The data set distinguishes between immigrants (born overseas) and the native-born males, those of different marital status, and ethnic groups: those from a European background, indigenous Maori, Pacific Islands birth place, an 'others' group mainly consisting of Asian immigrants, and a remaining group consisting of other ethnicities.

### 4. Methodology

Using an Ordered Probit estimation methodology originally considered by Aitchison and Silvey (1957) we first examine the effects of variables including educational qualifications and years since migration on occupational attainment. We then verify the effects of occupational attainment on earnings, and extend the conventional human capital earnings model with controls for major occupational groups. By comparing the results, we show the role of occupation in determining the earnings of immigrants. The Ordered Probit model used is our preferred modelling approach because it enables us to incorporate the hierarchical nature of occupational attainment in this analysis.

Mean occupational earnings are used as the measure of the desirability or attractiveness of an occupation. Hence the average hourly wage of each occupational group as reflected by the data is used to rank the occupations by order of attractiveness.

For a clear hierarchy for our Ordered Probit Model, we define five distinct occupational categories based on mean hourly earnings. The resulting occupational groups from the lowest to the highest are: 1. Elementary occupations; and Service and Sales workers; 2. Agriculture and Fisheries workers; 3. Trade workers; and Plant and Machine Operators and Assemblers; 4. Clerks; 5. Professionals, Technicians and Associate Professionals; and Legislators, Administrators and Managers. Based on this specification, each occupational category represents a clear differential category in terms of the hourly wage as demonstrated by the data (table 1).

Table 1 shows the occupational ranking based on mean hourly earnings for our samples across all six years. The highest earnings ranking occupations are those held by professionals, technicians and associate professionals, while the least ranking in terms of earnings are elementary occupations and agriculture and fishery jobs. Table 1 is useful in highlighting a hierarchy of occupational categories based on hourly earnings. This hierarchy corresponds with higher educational requirements across these occupations, and higher wages.



Table 1 - Average Occupational Hourly Wage

<i>Occupation</i>	<i>Hourly Wage *</i>
Professional, Assoc. Professionals; and Legislators, Administrators, Technicians, and Managers	29.80
Clerks	19.30
Plant and Machine Operators and Assemblers; and Trade Workers	18.76
Agriculture and Fisheries Workers	17.66
Elementary Occupations; and Service and Sales Workers	15.68

*Note:* \* Means (in constant, 2007 NZ dollars) for males, based on the Household Labour Force Survey (HLFS)/Income Survey (IS) pooled across for six years (2002-2007) utilised in this study.

1. Sample of employed males.

2. Standard deviations are respectively 30.08, 9.32, 11.37, 19.56, and 9.56).

3. Sample size: 37,949 observations.

Using the Ordered Probit model, we provide estimated probabilities of overall occupational attainment based on a unit change in each of our explanatory variables. For example, our analyses provide probabilities for an average immigrant to move up by one occupational category. The analyses further provide variations by educational qualification, each year since immigration, and by gender and ethnic group. In addition, the approach is flexible in allowing differential impacts for the explanatory variables for attainment of different occupational categories, which is important for precise estimations (e.g. different educational qualification levels can realistically have different effects on the probability of belonging to the professional occupations, as compared to clerical occupations).

The choice of five occupation groups is close to the study by Green (1999), which had four broad categories. Using the broad occupational categories in our study is constrained by our data, but it has two advantages. One advantage is that it provides clear occupational hierarchies for Ordered Probit analyses. A second advantage is that it allows us to clearly check whether, controlling for education and experience, a higher proportion of immigrants are engaged in lower-ranked occupations (e.g. elementary occupations or services), and whether we observe improvements in occupational advancement with years since migration. This categorisation allows us, for example, to capture movements of skilled immigrants who initially start work in less-skilled occupations or trades, and move to higher level occupations with time lived in the host country. A potential drawback of the use of broad categories is that occupational advancement effects may not be observed as often, or it may result in statistically insignificant effects for occupational movements. Nevertheless, as we show in our analytical section, this concern does not seem to be a major one, as we observe highly significant coefficients.

We further calculate and provide marginal probability effects, reflecting the change in the probability of belonging to each occupational category, for a one-unit change in each explanatory variable, keeping other characteristics constant. Marginal

probability measures are especially useful for summarising the results in easily interpreted percentage terms for belonging to each occupational category.<sup>5</sup>

We then verify the effect of occupational attainment on earnings, and extend the conventional human capital earnings model with controls for major occupational groups. By comparing both results the importance of the role of occupation when determining the earnings for immigrants is identified.

For this analysis, we first estimate standard earnings models based on the main human capital variables widely used in economics and related fields. These variables include educational qualifications, potential work experience (age minus years of study) and time in the host country for immigrants. These three sets of variables reflect the effect of human capital, which is expected to result in higher productivity and earnings in the labour market. We then augment our earnings models by adding each person's occupational category of employment. Thus a comparison of our models with and without occupation of employment can quantify the extent to which occupational attainment contributes to the relative earnings of each immigrant group.

We consider both occupational attainment and earnings effects across immigrant ethnic groups. Since we obtain parallel results for the native-born from the same ethnic groups, our results allow us to draw comparisons on effects for second and higher generation immigrants, compared to first generation immigrants in our immigrant groups' analyses.

The combination of our analyses of occupational attainment and earnings effects provides a more comprehensive exposition of the labour market experience of the immigrant groups of interest in our analysis.

Table A1 (Appendix) provides the definition of variables used in our occupational attainment and earnings models.

## 5. Results

### ***Hypothesis 1: Occupational Attainment Affects Earnings***

Table 1 indicates mean hourly earnings for our samples across all six years, and shows marked differences between professional and elementary occupations. For example, the hourly wage in the top occupational category is more than double that of the lowest, highlighting a clear hierarchy of occupational categories.

As noted earlier, these statistics do not control for factors such as education and skills and years of experience, and years since migration. In our analytical section we provide estimates that carefully control for these factors at the disaggregated level.

### ***Hypothesis 2: Human Capital Factors Affect Occupational Attainment***

Table 2 provides the comprehensive set of Ordered Probit results (based on maximum-likelihood estimation) and derived marginal effects for belonging to each occupational category for the immigrant and the native-born populations (see, e.g. Newell and Anderson (2003) on the derivation of marginal effects). In these tables we summarize the effects and the significance of each explanatory variable on the probability of moving from a lower occupation to the next higher level occupation, for male immigrants, and native-born, respectively (across years 2002 to 2007).

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<sup>5</sup> We augmented our analysis through additional estimates based on multinomial-logit estimations. The multinomial-logit approach assumes no particular order across the occupational categories. The results based on this added method support our findings based on the main analyses.

Table 2 - Ordered Probit Model of Occupational Attainment

Variable	Coefficients		Marginal effects (change in the probability of belonging to selected occupational category for 1 unit change in X)			
	Occupation Category		Elementary occupations and services (lowest rank)		Professional and Managerial (highest rank)	
	Immigrants	Native-born	Immigrants	Native-born	Immigrants	Native-born
High-school degree	0.256***	0.386***	-0.057***	-0.081***	0.100***	0.142***
Post-school qualification	0.589***	0.512***	-0.132***	-0.116***	0.228***	0.182***
University degree	1.575***	1.925***	-0.270***	-0.215***	0.566***	0.653***
Experience (in years)/10	0.474***	0.535***	-0.115***	-0.125***	0.183***	0.189***
Experience (in years)2/100	-0.096***	-0.100***	0.023***	-0.024***	-0.037***	-0.035***
Years since migration/10	0.268***	-	-0.065***	-	0.104***	-
Years since migration2/100	-0.063***	-	0.015***	-	-0.024***	-
European ethnicity	0.350***	0.128***	-0.083***	-0.031***	0.135***	0.044***
Maori ethnicity	-	-0.088***	-	0.021**	-	-0.031**
Pacific ethnicity	-0.178***	-0.007	0.045***	-0.001	-0.067***	0.003
Other ethnicity (mainly Asian)	-0.091	0.174**	0.023	-0.037**	-0.035	0.064**
Married	0.209***	0.118***	0.022***	-0.045 ***	0.079***	0.065***
Log of Likelihood	-9009.0	-38520.2				
Prob>chi <sup>2</sup>	0.0000	0.0000				
Probability of belonging to the category			0.159	0.151	0.402	0.310
Number of observations	7642	30307				

- Notes: 1. Sample of employed males.  
2. \*p<.10,\*\*p<.05,\*\*\*p<.01; - ( Not Applicable)  
3. Experience and Years since migration are measured in years (coefficients are reported in decades).  
4. All models include fixed effects for each year of data; Base category for Ethnicity is 'all other immigrant ethnicities'.

The first two columns of each table show the coefficients of the Ordered Probit model with five occupational categories, and significance levels of each variable. In columns 3 to 6 we report derived marginal effects of a unit change in explanatory variables on the probability of belonging to particular occupational categories. For brevity, we provide information on two major occupation rank categories: elementary and service occupations (lowest rank); and professional, administrative and managerial occupations (highest rank), which represent, respectively, lower-level and higher-level occupations.<sup>6</sup>

Positive marginal effect signs reflect an increased probability of belonging to the category in association with a one-unit increase in the explanatory variable, and negative effects reflect a decreased probability. Note that the same variable may have different effects in differently ranked occupation categories.

Our model performs well in explaining occupational attainment, and allows us to control for educational qualifications, work experience and, for immigrants, years since immigration.

<sup>6</sup> These results are available from the authors.

We find that occupational attainment is affected most significantly by educational qualifications, but that other factors also have influence. For example, as column 1 of table 2 shows, male immigrants' probability of belonging to a higher category is increased by 25.6 per cent of a standard deviation from having a High-school qualification, and by 157.5 per cent from a University degree.

The results show that, as predicted, 'Years since migration' increases the probability of moving from a lower-paid occupational category to a higher-paid one, indicating that although immigrants may initially be penalised by the imperfect transferability of qualifications or other disadvantages, over time they tend to move to better occupations. The negative sign of the quadratic term coefficient indicates the increases occur at a decreasing rate with increased years since migration. We estimate the additional chances of belonging to a higher-ranking occupation to be about 14.6 per cent of a standard deviation (of the spread of population across occupational categories) higher after a decade since immigration, and about 29.2 per cent of a standard deviation in two decades.<sup>7</sup>

Immigrants from a European country background have about a third (35.0 per cent) higher probability of engagement in a higher-ranked occupation, compared to the base category of other non-Asian and not specified immigrants. In contrast, immigrants from the Pacific Island countries have a 17.8 per cent lower probability. When educational and other relevant factors are controlled for in the model, these effects are weaker, but remain, compared to other immigrant groups. When considering each occupation category, immigrants from European countries have a 13.5 per cent higher probability of belonging to the highest of the five categories in our study, i.e. professionals. In contrast, immigrants from the Pacific Islands have a 6.7 per cent lower probability of belonging to that category. The statistically significant effects for immigrants, for example, the negative effects for the Pacific Island ethnic group compared to the positive effect for European immigrants of over 20 per cent, are in magnitude equivalent to occupational attainment gains expected on average within a decade and a half since migration for the overall sample.

Since our analysis of the native-born workforce in table 3 reflects occupational movement for second and higher generation immigrants, it complements our analysis of immigrants. The following results are noteworthy. A comparison of results across immigrants and the native-born shows that while the effect of all explanatory variables is compatible across the immigrant and native-born groups, educational qualifications and years of experience generally make larger positive impacts on occupational attainment for the native born, compared to immigrants. This effect as noted earlier is likely to reflect potential disadvantages of immigrants, partly due to incomplete transferability of educational skills or work experience, as noted earlier.

We further find that among the native-born population, when educational qualifications are controlled for, the probability of belonging to a higher occupational category for the Pacific Island population is no longer statistically significant, compared to the other native-born groups. In addition, compared to other native-born workers the positive differential probability of belonging to highest occupational category (i.e. professionals) is smaller for the native-born workforce with a European background

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<sup>7</sup> We use the coefficients and their quadratic in table 2, column 1, for marginal effects setting the values of Years since migration, to one and two decades respectively  $(0.272 - 2(0.063) = 0.146$  for one decade; and  $0.272(2) - 2(0.063)(2) = 0.292$  for two decades).

(4.4 per cent compared to 13.5 per cent for immigrants from a European background). The results for the native-born population of Pacific Island and European ethnic backgrounds provide complementary analyses, which generally signal regression to the mean and economic opportunity for the second and higher generations of immigrants.

### ***Hypothesis 3: The Effect of Human Capital Variables on Earnings is Partially through Occupational Attainment***

Here, we examine the extent to which educational qualifications, years since migration and ethnic group influence earnings through occupational attainment. The results from standard earnings models and expanded models which also control for the five occupational categories are summarised in table 3. The dependent variable is the natural logarithm of the hourly wage. The explanatory variables include educational qualifications, years of experience, and years since migration. As the dependent variable in these models is the natural logarithm of hourly earnings, the coefficients (x100) are interpreted as reflecting percentage effects on hourly earnings.<sup>8</sup>

Table 3 - The Mediating Effect of Occupational Attainment on Hourly Wage

Variable	Immigrants			Native-born		
	Standard Model	With Occupational Attainment	Percentage Change from Standard the Model	Standard Model	With Occupational Attainment	Percentage Change from Standard the Model
High-school degree	0.121***	0.084***	-30.6	0.137***	0.088***	-35.8
Post-school qualification	0.240***	0.157***	-34.6	0.232***	0.172***	-25.9
University degree	0.488***	0.305***	-37.5	0.549***	0.374***	-31.9
Experience (in years)/10	0.323***	0.270***	-16.4	0.375***	0.330***	-12.0
Experience (in years)2/100	-0.066***	-0.055***	-16.7	-0.073***	-0.065***	-10.9
Years since migration/10	0.106***	0.076***	-28.3	-	-	-
Years since migration2/100	-0.023***	-0.016***	-30.4	-	-	-
European ethnicity	0.156***	0.106***	-32.0	0.061***	0.045***	-26.2
Maori ethnicity	-	-	-	-0.020*	-0.008	-
Pacific ethnicity	-0.101***	-0.066***	-34.6	-0.007	-0.007	0.0
Other ethnicity (mainly Asian)	-0.051**	-0.046**	-9.8	0.011	-0.010	0.0
Married	0.085***	0.063***	-25.9	0.119***	0.099***	-16.8
Constant	2.172***	2.167***	-0.2	2.218***	2.200***	-0.8
R <sup>2</sup>	0.316	0.388		0.328	0.379	
F-value	298.1	260.5		1364.3	1002.3	
Prob>F	0.0000	0.0000		0.0000	0.0000	
Number of observations	7642	7642		30307	30307	

Notes: 1. Sample of employed males.  
2. \*P<.10,\*\*P<.05,\*\*\*P<.01; - - ( Not Applicable)  
3. Experience and Years since migration are measured in years (coefficients are reported in decades).

<sup>8</sup> For example a coefficient of 0.10 for a continuous variable such as years since migration represents approximately a 10.5 per cent increase in hourly earnings associated with a one unit change in the explanatory variable. For binary variables, e.g. Post-school or University degree, the percentage effect is: (the anti-log of the coefficient- 1)(x100), which is slightly larger than the above calculation).

The results confirm the significance of occupation in explaining immigrant earnings differentials. For example, when occupation is controlled for, as columns 3 and 6 of table 3 show, the coefficient for a University degree decreases by 37.5 per cent for immigrant men, and by about 32 per cent for native-born men, suggesting that a significant part of the increase in earnings associated with a University degree occurs through entrance into higher-paid occupation. Results for Post-school and school qualifications are almost as strong.

Table 3 column 3 further shows that 28.3 per cent of the effect of years since migration for immigrant men is through occupation. We have obtained these results despite using broad occupational categories, which can result in insignificance of coefficients.

Some differentiable results occur for different ethnic groups. For example, with occupation controlled for, among the native-born and immigrants approximately a quarter to a third (26.2 per cent and 32.1 per cent, respectively), of the increase in earnings associated with being in the European group occurs through entrance into higher-paid occupations. The opposite effect applies for the impact of Pacific group and others on earnings for immigrants: a reduction of the estimated coefficient value for the Pacific group immigrants by about a third (33.7 per cent), indicating the importance of occupational attainment in explaining earnings for the group, whereas for the 'others' (mainly Asian) group the reduction is more modest at 9.8 per cent.<sup>9</sup> These results indicate that occupational attainment plays a greater role in explaining earnings effects in immigrant groups from both European and Pacific countries, compared to the other groups of immigrants.

An implication of these results for econometric modelling is that when occupation is not included in earnings models, the coefficients for other important and correlated variables, such as educational attainment and ethnicity, combine their direct effects on earnings with omitted indirect effects through occupational attainment. We find that the indirect effects through occupational attainment are very significant.

We further find that among the native-born population, when educational qualifications are controlled for, for the Pacific Island population earnings is no longer statistically significant, compared to the other native-born groups. In addition, compared to other native-born workers, the positive earnings effect for the native-born workforce of European background is smaller than for immigrants of European background (6.1 per cent compared to 15.6 per cent, respectively). These results further indicate regression to the mean and economic opportunity for the second and higher generations of immigrants.

In summary, the return to having a University degree for immigrants achieved through occupational earnings mobility is more than a third of the returns reported for the conventional earnings function. The added effect of return to Years since

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<sup>9</sup> We also examined occupational attainment and earnings for women based on the same data set. While we are not reporting those results here for brevity and given the different focus of the two analyses, those results show that for female immigrants the advantages of having higher qualifications for entering into higher-paid occupations are relatively greater than for males and for native-born women. Compared to immigrant men, the mediating 'occupation effect' is also larger for immigrant women from a European background, and the negative impact for the Pacific island group is also larger.

migration through occupational effects is more than a quarter of the return reported for the conventional earnings function for immigrants. In addition, a major part of the remaining effect of ethnicity on earnings is through occupational attainment. Our results confirm that for both immigrants and native-born workers occupation is indeed closely connected to earnings outcomes.

## 6. Conclusion

Some of our key results are as follows. We find that the probability of engagement in higher occupational categories is most significantly affected by educational qualifications, and that occupational attainment is an important mechanism through which education and skills result in higher earnings.

Our results highlight the importance of possessing a higher education (a Post-school qualification, or a University degree) in accessing highly ranked occupations. This effect is large but not uniform across the immigrant and native-born groups: for immigrants who seek to attain the highest occupational categories, there is some disadvantage compared to the native-born workforce with similar educational qualifications.

For immigrants, having a University degree is associated with a significant return achieved through occupational earnings mobility, at more than a third (37.5 per cent) of the return reported for the conventional earnings function. The effect of return from years since migration through occupational effects is also high, at approximately over a quarter (28.3 per cent) of increased earnings reported for the conventional earnings function. Our results therefore confirm that occupation indeed plays a key role in determining the earnings outcomes for both immigrants and natives.

In addition, we find that once educational qualifications are controlled for, progress to higher occupation categories for immigrants takes place with both increased work experience and years of residence in the host country. Based on our results it would take the average immigrant a decade and a half to progress to a higher occupational category. These effects vary significantly for different ethnic groups. Such results have implications for various 'end-users' of migration. For government, public service agencies and migrants themselves they draw attention to the importance of occupation as well as education as a means of climbing local 'earnings ladders' following migration.

We further show that accounting for occupational attainment significantly improves the explanatory power of immigrant earnings regressions, and our results across both Ordered Probit models of occupational attainment and earnings regression models highlight the significant mediating role of occupational attainment in explaining earnings across immigrant and native-born groups.

Finally, the results indicate that migration opportunities for occupational progress in New Zealand are strong. The skilled migration policy feature of the New Zealand immigration policy may be related to this positive outcome.

## Appendix

Table A1- Definition of Variables

<i>Variable</i>	<i>Definition</i>
Experience (in years)	Years of potential experience measured as age minus age at completion of education
Years since migration	Years since migration to host country in years
High-school degree	Binary variable = 1 if highest degree is a High-school degree, =0 otherwise
Post-school qualification	Binary variable = 1 if highest degree is a Post-school qualification, =0 otherwise
University degree	Binary variable = 1 if highest qualification is a Bachelor degree or higher, =0 otherwise
European ethnicity	Binary variable = 1 if ethnic background is specified as from Europe or European descent, = 0 otherwise
Pacific ethnicity	Binary variable = 1 if ethnic background is specified as from Pacific Islands or Pacific Island descent, = 0 otherwise
Maori ethnicity	Binary variable = 1 if ethnic background is specified as Maori or Maori descent, =0 otherwise
Other ethnicity (mainly Asian)	Binary variable = 1 if ethnic background or descent is specified as from Other source countries (mainly Asian), = 0 otherwise
Married	Binary variable = 1 if currently married, = 0 otherwise
Year	Binary variable for year of data
Hourly Earnings	Natural logarithm of hourly earnings
Occupation Category 5:	Professionals, technicians, associate professionals, legislators, administrators, and managers
Occupation Category 4:	Clerks
Occupation Category 3:	Plant and machine operators, assemblers, and trade workers
Occupation Category 2	Agriculture and fisheries workers
Occupation Category 1:	Elementary occupations, and services and sales workers

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