

Impacts of a High-skilled Immigration Policy and Immigrant Occupational Attainment on Domestic Wages

Sholeh Maani and Yu Chen, The University of Auckland

Abstract

The recent international literature on immigration wage effects has shown contrasting results. Past studies have focussed on the effect of low skilled immigrants on native-born workers in the US, and have yielded results ranging from no impact to negative impacts. This paper, by contrast, explores the outcomes of highly skilled immigration on the wages of native born workers in a controlled environment. New Zealand represents a useful case study in this context, as it actively encourages skilled immigration and has exceptionally accurate immigrant data. Our analysis makes use of unit record data and incorporates labour markets across region, skill, and occupation groups. One of our contributions to this literature is to consider occupation and region as separate labour market choices. Furthermore, we separate the traditionally combined groupings of worker skill and occupation, thereby allowing us to study them independently. This approach enables us to realistically examine the downward movement by some immigrants to occupations that require less skill, and it provides greater detail that lends itself to more accurate analysis of potential wage effects. We find that contrary to what may be commonly expected there is no adverse wage impact from skilled immigration on native workers of similar skill. In addition, we find that highly skilled immigration has a small negative wage effect for low-skilled native workers. We discuss this effect while considering imperfect substitution, immigrant occupational movements, and the importance of auxiliary settlement policies to accompany high-skilled immigration policies.

JEL Classification: J61, J62, J31, J3, J24

Address for correspondence: Associate Professor Sholeh Maani, Department of Economics, Auckland Business School, The University of Auckland, Private Bag 92019, Auckland, 1141, New Zealand, Email: s.maani@auckland.ac.nz

Acknowledgments: We wish to thank Statistics New Zealand for the use of Confidentialized Unit Record File (CURF) data; the Faculty of Business and Economics at the University of Auckland and the NZ Department of Labour for research grants; George Borjas and Stephane Mahuteau for helpful comments; and Isabella Gawith, Michael Tse and Xingang Wang for research assistance. The authors alone are responsible for the views expressed.

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1. Introduction

Few economic questions raise as much public interest as the effect of immigration on the wages of native-born workers. A number of international factors such as regionalisation have facilitated greater immigration by skilled workers in the past decade. Furthermore, professional job markets are predicted to become increasingly international over the coming years, making any insights into the effects of skilled immigration on regional job markets all the more relevant.

The recent international literature on the impact of immigrants on the wages of native workers has shown contrasting results (e.g. Altonji and Card, 1991; Borjas, *et al.*, 1992; Borjas, 2003; Card, 1990, 2005). In addition, reviews of previous studies have consistently highlighted unanswered questions and the need for further research in this area (see for example, Longhi, *et al.*, 2005; Poot and Cochrane, 2004; Dustmann and Gritz, 2005). In general, these studies have focused on the impact of low-skilled immigrants on native-born workers in the US labour market.

We instead focus on high-skilled immigration in New Zealand, thus extending the international literature in two ways. Firstly, by using data on New Zealand, which has a number of favourable characteristics (as explained below), we are able to analyse the differential impacts of high skilled immigration as opposed to low skilled immigration. Secondly, by using a rich data set, we are able to analyse certain skilled-immigration phenomena in better detail than past studies.

New Zealand represents a very useful case study in this context, as its immigration policy encourages skilled immigration which ensures a steady inflow of skilled immigration, and it has a relatively isolated geographic location which prevents illegal immigration from occurring and thereby allows for uniquely accurate immigrant data.

Traditionally, New Zealand is an immigrant-receiving country. For example, annual net migration has accounted for more than 40 per cent of the total population growth from 1973 to 1975, 1995 to 1997, and 2002 to 2004.

In addition to New Zealand being a controlled case study for the effects of skilled immigration, we have obtained a rich data set that allows us to specify occupation groups separately from skill level, which allows us to examine the tendency of some high-skilled immigrants to initially find employment below their skill level. Card (2001), for example, finds evidence of skilled immigrants taking less-skilled jobs in the US. To assess these phenomena, we use data from the Household Labour Force Survey and corresponding Income Supplement data set. This data set has a number of favourable features, including comprehensive worker wage, skill, and employment information. We use data for a period which is of special interest (2003-2004), following high net immigration intake.¹ In this context, we incorporate regional, skill, and occupational labour markets as the most relevant units of analysis. We examine the effect of skilled immigration on the wages of both high-skilled and less-skilled native-born workers in New Zealand.

¹ For example, the contribution of immigration to population change in New Zealand was a net gain of 41,600 people in March 2003, which exceeded the natural population increase of 26,900 people over the same period.

We first test the hypothesis of factor-price equalization: assuming that labour is mobile in the open economy, workers move to where the wages are highest until supply and demand balance to equalize wages between cities (Friedberg and Hunt 1995). This implies that native workers move cities when immigrants with similar skill level arrive, thus leaving the labour market skill base intact in the city that welcomes the immigrants. We go on to test the effects of immigration on the wage of various skill groups of native workers in the relevant labour market. A-priori, the supply response effect is unknown (e.g. Borjas, 2003; Card 2005).

When regressing native workers' wage rate on the supply of a given skill level of labour, immigrant labour supply is potentially endogenous, because immigrants may choose the city in which they settle based on higher expected wages. We address this potential endogeneity of immigrant labour supply through instrumental variable (IV) estimation, and statistically verify the suitability of our IV selection. We then examine hypotheses of wage effects for the native-born workers across occupational and skill-regional markets (Card, 2005; and Addison and Worswick, 2002). Next we conduct sensitivity analyses using a more direct specification; alternative migrant variable definition and age group; and evidence based on changes in immigrant supply over time. Finally, we discuss our results and their immigration policy implications.

The structure of this paper is as follows: firstly, the data and sample characteristics are presented. Then a review of the literature and modelling approaches is provided. Thirdly, the econometric model and results are discussed, followed by conclusions and policy implications.

2. Data and Sample Characteristics

At the outset, we define 'immigrant' as any foreign born person (independent of how long they have lived in New Zealand).² While 'native' or 'New Zealand' workers in this specification are all those born in New Zealand.

Long-term analysis of population flows to and from New Zealand show that, while population inflows and some outflows from New Zealand are evident throughout the past decades, New Zealand is clearly a net immigrant receiving country (Glass and Choy, 2001, NZ Treasury). An examination of the skill base of population movements to and from New Zealand further shows that, while emigrants from New Zealand have a skill base similar to the average New Zealander, immigrants to New Zealand have higher education levels than the average New Zealander.³

As previously mentioned, there are two important characteristics of this data set. Firstly, using data on New Zealand, which encourages skilled immigration and has limited illegal immigration, provides an interesting contrast to much of the previous literature, which is based on unskilled immigration to the US. Since 1991, New Zealand has had an immigration policy that selects immigrants on the basis of

² The definition of the relevant immigrant group for analysis varies across the literature (e.g. foreign born, or recent or medium-term (five to 10 year) immigrants). In this paper we specify immigrants as the overseas born. This definition of immigrants reflects the long-term nature of immigration and its outcomes. Our analysis further includes two sensitivity analyses: based on an alternative definition of immigrant (migration within 10 years); and difference-in-differences analyses for effects from immigration in the previous year.

³ See for example, Glass and Choy (2001).

education and general human capital.⁴ This has resulted in immigrants having higher education levels compared to the New Zealand born (see table 1).⁵

The second important characteristic of our data is that we distinguish between skill level (using highest educational attainment as a proxy) and occupation. This is important because skilled immigrants with a higher degree are more likely to find employment in sectors below their skill level than New Zealand workers of similar skill.

In this paper we use unit-record data from the Household Labour Force Survey (HLFS) and the New Zealand Income Surveys (NZIS). The Household Labour Force Survey is a quarterly survey of approximately 29,000 individuals (approximately 15,000 private households). The 2004 HLFS /NZIS (June Quarter Unit Records) used in this study includes 27,847 individual records. The target population for the HLFS is the resident population, and as such is comprehensive. Overseas visitors, who expect to reside in New Zealand for less than 12 months, and the population younger than 15 years are not included. For an additional sensitivity analysis, we use both the 2003 and 2004 data sets. The combined HLFS/ NZIS data has a number of advantages, including details of hourly wage, weekly earnings, and comprehensive data on educational qualifications and occupation.

Table 1 presents the sample characteristics across immigrant and native-born populations in New Zealand in 2004. As table 1 shows, 30.1 per cent of immigrants have a Bachelor's or higher degree, compared to 14.1 per cent of New Zealand-born workers. In addition, about 13.8 per cent of immigrants have less than a high-school qualification, compared to 19.3 per cent of native-born workers. Furthermore, this pattern holds within most regions of New Zealand. For instance, in the Canterbury region, about 40.4 per cent of immigrants have a Bachelor's degree or higher, compared to only 13.2 per cent of the native-born population. This suggests that New Zealand's immigration policy of attracting highly skilled workers has potentially been successful.

Our data also shows that skilled immigrants are more likely to settle in larger cities. For example, the Auckland region – a major business centre and the most populous city – has the highest percentage of immigrants of any New Zealand region with immigrants comprising 45.3 per cent of the population. The second highest concentration occurs in the capital city, Wellington, where 12.8 per cent of the population consists of immigrants.

⁴ For example, the New Zealand Skilled Migrant Category Points Indicator requires that applicants answer the following questions. If the answer to all first four questions and at least two other questions is YES, applicants are encouraged to proceed. The eligibility test questions are: 1. 'Are you under 56 years of age?' 2. 'Are you, your partner and your children all healthy?' 3. 'Are you, your partner and your children free of major criminal convictions and not a security?' 4. 'Can you completely speak, write and understand English?' 5. 'Do you have a tertiary or trade qualification?' 6. 'Have you been offered a job in New Zealand?' 7. 'Do you have at least two years work experience?' In the points system, higher education carries significant points.

⁵ The current Skilled Migrant Category (SMC) and the corresponding 'point system' were established in the 1991 Immigration Amendment Act. Based on the SMC point system, migrants are classified on their personal and educational qualifications, work experience, or a job offer in New Zealand. A feature of the point system that is noteworthy is that a prior job arrangement is not required for immigration. At the time of the last Census, 57 per cent of the residency applications were approved under Skilled Categories (Source: www.immigration.govt.nz). The United Kingdom is the largest source country of Skilled Migration Categories, followed by South Africa, and China.

In this paper we limit our data to male workers, as the employment patterns and the experience of female immigrants are generally different to that of female native-born workers, whereas the experience of male immigrants and locals is more directly comparable. We also limit the age range to 25-54, in the aim of excluding students and individuals nearing retirement. We only employ data with non-missing country of birth, qualification, and occupation. The sample included in our analyses in the relevant age groups and categories consists of 6,166 in 2004 and 6,499 in 2003.⁶

Table 1 - Share of Native-born and Immigrant Workers who have Attained Different Levels of Education

<i>Highest Education level attained</i>	<i>NZ born (%)</i>	<i>Immigrants (%)</i>
No Qualification (Incomplete High-school)	19.31	13.77
High-school Degree	18.50	20.38
Bachelor's or higher degree	14.13	30.13

Data: Household Labour Force Survey, New Zealand Income Supplement HLFS/ NZIS, 2004, Male, age group 25-54 (N: 6,166, 4,902 NZ born and 1,264 immigrant).

In this literature, the use of well-defined and internationally comparable educational/skill categories is important for analyses of relevant labour markets and supply effects across immigrants and the native-born groups. Card (2001), for example, focuses on the group with incomplete high-school education, compared to the base group of high-school graduates; Borjas (2003) and Card (2005) consider four groups based on completion or incomplete high-school and university education; and Borjas (2005) focuses on immigration effects with doctoral degrees. We focus on three well-defined and comparable educational/skill groups specified in our data across the immigrant educational/skill groups: a Bachelor's degree or higher (high-skilled), and incomplete high-school education (less-skilled), in comparison to the base group with a high-school degree. In this literature, vocational degrees are generally not considered in the comparative analyses,⁷ since they are usually not included in high-skilled migration policies, and they represent a wide range of qualifications and skills which would arguably introduce measurement error in controlling for skill levels across immigrants and domestic workers. Therefore, the high-skilled and less-skilled categories in this literature provide upper and lower bound skill levels that are well-defined for relevant comparisons, and that is the approach that we follow.

3. Review of the Literature and Modelling Approaches

In recent studies, the estimated effects of immigration on native-born workers' wages have generally been negative, of small magnitude, or insignificant. For example, Altonji and Card (1991) find that a one percentage point increase in the fraction of immigrants in the US reduces the wages of less-skilled US born workers by 0.3 per

⁶ Throughout the analyses the usual appropriate sample population weights are applied.

⁷ An exception is, for example, the study by D'Amuri, Ottaviano, and Peri (2010) on wage effects of immigration in Western Germany. They account for vocational degrees, given the skill-base of the immigrants to Western Germany.

cent. Similarly, Borjas (2003) finds that immigration lowers the wage of competing workers: a 10 percentage point increase in labour supply of the skill group in question reduces wages amongst that skill group by three to four per cent. In contrast, Card (2005) finds no relationship between the relative supply of workers who did not finish high school ('dropouts') and their relative wages. Furthermore, Dustmann, *et al.* (2005) and Addison and Worswick (2002) do not find an adverse impact of immigration on the real wages of UK and Australian-born workers respectively. Similarly, in a cross sectional analysis of Austria's job market using 1991 data, Winter-Ebmer and Zweimuler (1996) do not find a negative impact of region or industry share of foreign workers on native workers' earnings. In terms of New Zealand based studies, Boyd (2003) examines the labour market performance of immigrants in New Zealand, while Mare' and Stillman (2007) examine regional settlement patterns of immigrants in New Zealand.

The international economics literature has adopted three major estimation approaches to measuring the impact of immigration on labour market outcomes: panel data models, production functions, and cross-regional models. These three approaches are briefly discussed in the following section.

Time-series / Panel Models

In this approach, national time-series or panel data are used to investigate the impact of immigrants on the labour market outcomes of native workers. In these specifications, the labour market is assumed to adjust to immigration because native-born workers are presumed to be fully mobile, such that factor price equalization equates wages across cities. In other words, if there is an inflow of low-skilled immigrants to a city, low-skilled native born workers in that city are assumed to move to another city. As such, this approach bypasses geographic or regional labour market wage differences. Characteristics that are used to define a skill group are educational attainment and work experience.

Borjas (2003) uses 32 skill-experience groups and finds that a 10 per cent labour supply shock reduced the annual earnings of native workers by 6.4 per cent. In addition, he found that the impact of immigrants on the weekly earnings of native workers is smaller than the effect of immigrants on the annual earnings of native workers, reflecting a drop in hours supplied in response to lower wages. Furthermore, the study found significant and negative impacts of immigration on the weekly earnings of all educational groups except for the group of college graduates. Interestingly, immigration was found to have a positive impact on the weekly earnings of college graduates. This effect may reflect positive externalities for college graduates working alongside skilled immigrants. There are three main concerns regarding the time-series approach. Firstly, the key assumption that native workers move cities to adjust to an influx of immigrants is subject to debate (see Card, 2005). Secondly, the time-series approach requires large data variation across extended time periods to generate reliable results. Thirdly, the aggregate approach can potentially introduce a bias toward zero: immigrants are more likely to migrate to a country at times when labour market outcomes are favourable. Production function and cross-regional approaches bypass these potentially serious concerns.

Production Functions

A production function approach generally uses cross-sectional data to estimate elasticities of substitution between immigrant and native workers (see for example Grossman, 1982). In New Zealand, Maré and Stillman (2007) used a similar method, based on both constant elasticity of substitution (CES) and Generalized Leontief production functions. They used unit record data for the entire New Zealand population from the 1996 and 2001 census. Since New Zealand has an immigration system that focuses mainly on higher-skilled migrants, they classified individuals into two different definitions of skilled groups and allowed for substitutability, both across and within these groups.⁸ They investigated the impact of recent immigration on the labour market using the area-analysis approach by creating labour market areas according to travel-to-work data. They found little evidence that recent migrants reduce the wages of native workers in New Zealand.

Cross-regional

The cross-regional methodology is the most commonly adopted approach in the literature on the impact of immigration on the wage of native workers (Borjas, 1987; Lalonde and Topel, 1991; Jaeger, 1996; Card, 2001 and 2005) and the approach that we employ in this paper. It makes use of cross-sectional data on states and regions to analyse the relationship between the differences in immigrant density and the difference in the wages of native workers across cross-sections.

This methodology involves two steps: firstly, regressing the proportion of the workforce with a given skill level on the proportion of *immigrants* with the skill level, to examine the theory of factor price mobility. Secondly, the previously explained proportion of the workforce with a certain skill level is used to explain the wage rate of native workers with that skill level. These two steps are now examined in more depth by analysing Card's (2005) approach.

Card used data from the 2000 US census to classify the immigrant population by their skill levels. Due to the US immigration policy of allowing existing immigrants to bring their, often unskilled, family members to the US, and due to the problem of illegal immigration in the US, in 2000 a very high fraction of US immigrants had low levels of schooling. Assuming that immigrants and native workers are potential substitutes within a given skill group, labour market competition from low-skilled immigrants is expected to be most intense for native workers with the lowest levels of education.

First of all, Card tested the theory of factor-price equalization: native workers move cities when immigrants of similar skill levels arrive. It is necessary to test for this, because if factor price equalization does occur, then even if the flow of immigrants does affect the wages of native workers at the national level, the cross-sectional approach may not capture it. To examine the extent of factor price equalization, the following regression is run, which explains the share of the work force (S) with a certain degree of education (d), by the share of the population with that degree of education that are *immigrants* (I). Card uses 'high school drop out' as the education level of interest:

⁸ Firstly, they created six five-year age-groups, five qualification groups, and thus thirty age-qualification groups. Second, a skilled group was created according to four aggregated occupations. They allowed for different degrees of substitutability between and across those skilled groups and treated different skill groups as a factor of CES and Generalized Leontief production functions.

$$S^d(c) = \alpha + \beta S^{dt}(c) + e(c).$$

where $S^d(c)$ is the share of high school dropouts in the regional working age population in city c , and is the sum of the share of native dropouts $S^{dN}(c)$ and the share of immigrant dropouts $S^{dt}(c)$, where $e(c)$ is a residual.

Of particular interest is the coefficient β : if β equals zero, then for each new immigrant of skill level d to city c , a native worker of skill level d leaves (this would occur if there were perfect factor price equalization). In such a case, the following regression analysis would give a wage effect of immigration on native workers that is biased towards zero. If β was between zero and one, then for every new immigrant of skill level b , the share of total skill level b in the workforce rises less than proportionately. This would result in the underestimation of the wage effect.

In a univariate regression across cities, Card (2005) rejected both hypotheses, instead estimating that β values ranged from around one to 1.3. He concluded that each new immigrant in the lowest skill group is estimated to add to the net supply of low-skilled workers in a city. This indicates that immigrants do not decrease the relative supplies of native-born 'dropout' labour across localities, and thereby wage effects will not be under-estimated or gravitate toward zero.

The second step is then to determine the effect of an increase in the share of immigrant workers of a given skill level on native-born workers' wages using the following regression:

$$\text{Log}(w^d(c)) = a_1 + b_1 \log(s^d(c)) + e(c)$$

where w^d is the wage rate of US workers who dropped out of high school, and s^d is the share of the total workforce (US and immigrant) that fits into the 'high school drop out' skill group.

However the wage rate of native workers in a given city may affect immigrants' choice of city (and thus the share of the total population of a given skill level): higher wages attract more immigrants. This endogeneity may positively bias the coefficient on the share of total workers that are of a given skill level. In this case, a positive relationship between immigrants and wages of native workers may be found in a case where the actual relationship is negative. To address endogeneity, Card used the historical immigration pattern as an instrument for current inflows. For example, in a second paper, Card and Dinardo (2000) use the fraction of Mexican immigrants in the city in 1970 as the instrumental variable for low-skilled immigration inflows between 1980 and 1990. Those instrumental variable (IV) models provided no indication that the ordinary least squares (OLS) estimates are biased by regional demand shocks.

After resolving the concerns of factor price equalization and endogeneity, Card (2005) examines the impact of low-skilled immigrants on the relative labour market outcomes of less-skilled native-born workers. The resulting OLS and IV estimates were very similar, suggesting the endogeneity problem is minimal. Results suggested that an increased supply of high school drop outs from unskilled immigration does not lower the wage for the native-born high-school drop outs. But they point to a small negative employment effect for high-school drop outs: even though their hourly wage does not fall, their annual earnings do, as unskilled immigrant workers reduce the number of hours worked by unskilled native-born.

4. Models and Results

Wage Effects of Skilled Immigration on Skilled Native-born Workers

We apply a similar cross-regional approach to Card (2005) in this paper. Due to New Zealand's high-skill immigration policy, we focus on the educational groups with a Bachelor's or higher degree (high-skilled), and less than high-school completion (less-skilled), compared to the base group of high school graduates. We incorporate eight broad occupational labour markets, across regions.⁹ The occupational categories range from manual workers to professionals, and they reflect distinct occupational markets for the analysis.

In this literature, discussed above, large metropolitan areas, states, or regions are used as labour markets for analyses. An advantage of considering state or regional units is that it provides distinct labour markets, thereby reducing measurement noise of residential moves. The Confidentialized Unit Record Household Labour Force Survey (CURF, HLFS) data, which we incorporate in this study, specifies six regions for New Zealand. These regions cover six main major cities where main populations live, with surrounding more sparsely populated areas. These regional specifications cover distinct areas, which for the purpose of the study would not be affected by housing/commuting movements. Each region is based on a major city where most of the population in that region lives, and high-skilled jobs for both the native-born and immigrants are mostly available. In the North Island, the four regional labour markets are based on Whangarei, Auckland, Hamilton, and Wellington. In the South Island, regions are based on the two major cities of Christchurch, and Dunedin. In the case of New Zealand, the regions cover smaller areas and populations compared to the states in the U.S. – nevertheless representing distinct areas for analysis.¹⁰ This specification, based on eight occupational markets, across six regions and major educational groups, provides 48 distinct labour markets for each educational group (Borjas's (2003) analysis, for example, had 32 data points). These data units are based on a large sample of 6,166 males in the labour force. The large number of observations in these categories provides a spread of data in reasonably large sized groups (data cells) for analysis centred around the largest cities.¹¹

⁹ The eight one-digit occupational classifications are: (1) Legislators, administrators & managers, (2) Professionals, technicians & associated professionals, (3) Clerks, (4) Service & sales workers, (5) Agriculture & fisheries workers, (6) Trades workers, (7) Plant & machine operators & assemblers, and (8) Elementary occupations. These categories provide distinctly different occupational groups for our purposes.

¹⁰ These regions also include less-populated areas that are not affected much by labour supply movements. This is common across regional and state-wide labour market studies in the international literature, combining effects in major population areas with surrounding less-populated and not much affected satellite areas. In this respect, New Zealand's case is not different from other studies. This inclusion would understate the size of the supply shock for the high-skilled, and potentially over-state wage effects. However, since both high-skilled native-born and immigrants are mainly employed in the major cities, this effect is expected to be very minor.

¹¹ Encountering some empty cells is common in this type of specification across some education and occupation groups. We encountered eight empty cells (out of 48 cells) in certain region-occupation-skill levels, which were eliminated from the sample. However, importantly, for all education-occupation employment combinations in our analysis data, there is sufficient variation in the data across localities, and data cell sizes in our estimations are all statistically viable.

We make a distinction between the effects of immigration on the hourly wage and annual earnings, and we report on both. This distinction is important, because annual earnings takes into account changes in the number of hours worked in response to any changes in hourly wages as seen in Card (2005) above. For example, 'if the labour supply curve of the native born has the usual positive slope, a downward effect on the wage would lead to a decline in both hours worked and labour force participation. This 'hours effect' tends to make the impact of an immigration inflow on annual earnings greater than on hourly wages', (Poot and Cochrane, 2004).

Occupation Congruence Index

It is important at the outset to measure the similarity of occupations between native-born and immigrant workers. We construct an index of congruence. The congruence coefficient (Borjas, 2003) is defined as follows:

$$G_{N,I} = \frac{\sum_k (q_{N,k} - \bar{q}_k)(q_{I,k} - \bar{q}_k) / \bar{q}_k}{\sqrt{(\sum_k (q_{N,k} - \bar{q}_k)^2 / \bar{q}_k)(\sum_k (q_{I,k} - \bar{q}_k)^2 / \bar{q}_k)}} \quad (1)$$

$G_{N,I}$ is the congruence coefficient between native-born workers (N) and immigrant workers, (I). $q_{i,k}$ is the fraction of a particular skill group of workers (e.g. immigrant workers with Bachelor's or higher degree) in occupation k . \bar{q}_k is the fraction of the entire work force that is engaged in occupation k .

A congruence coefficient (index) is similar to a correlation coefficient (within ± 1), where positive values indicate similarities of occupations, and negative values indicate that natives and immigrants are engaged in dissimilar occupations. A value of +1, for example, represents the complete similarity of immigrant and native workers in their occupational engagement, and a value of -1 represents no overlap at all in occupational engagement.

The congruence index between the native-born and immigrant workers that have Bachelor's or higher degree qualifications is +0.83. This high congruence coefficient (close to 1) means that highly skilled native and immigrant workers are employed in similar occupations. This measure shows that highly skilled immigrant and native-born workers are employed in the same job markets. An important implication of this high correlation is that the major potential impact of skilled immigration is the possible effect on the skilled native-born job market, as the main focus of this paper.

Labour Supply and Wage Effects

Following the two-step method, we firstly test the hypothesis of factor price equalization to ensure that native workers do not perfectly adjust to the inflow of immigrants to equalize wages across cities. We use the following regression, which explains the share of the workforce with a Bachelor's degree in labour market ik , by the share of the workforce with a Bachelor's degree that is *immigrant*.

$$S^b(c)_{ik} = \alpha + \beta S^{bl}(c)_{ik} + e(c)_{ik} \quad (2)$$

$i = 1, \dots, n$: regions

$k = 1, \dots, m$: occupations

where $S^b(c)_{ik}$ is the share of the male labour force with a Bachelor's or higher degree in labour market c (constructed by region i and occupation k). $S^b(c)_{ik}$ is the sum of the percentage of the male labour force in a labour market with a Bachelor's or higher degree which is native, $S^{bN}(c)_{ik}$, and the percentage which is immigrant, $S^{bI}(c)_{ik}$, while $e(c)_{ik}$ is the residual.¹²

This study finds that β is greater than one, meaning that for every new skilled immigrant in labour market ik , the share of the total workforce with a Bachelor's degree increases – meaning skilled immigrants are not perfect substitutes for skilled native workers. Therefore, this evidence does not support the 'factor price equalization' hypothesis. In other words, high-skilled immigrants tend to settle in areas where there is already a relatively high number of high-skilled native born workers. The greater than one estimated coefficient (β) indicates that the potential wage effects due to immigrant labour supply may, in contrast to previous concerns, be over-estimated (in absolute terms). This provides an upper bound case for potential immigrant wage effects. Given that the main concern in this literature has been the potential under-estimation of immigrant wage effects, this characteristic of the analysis is useful and of interest in this context.

Table 2 - Supply Effects: showing how an increase in the share of the immigrant workforce in labour market ik with Bachelor's degree affects the overall fraction of the labour force with Bachelor's degree in that labour market

Equation (2): $S^b(c)_{ik} = \alpha + \beta S^{bI}(c)_{ik} + e(c)_{ik}$

Explanatory variable	OLS coefficient β
Fraction of immigrants with a Bachelor's degree or higher $S^{bI}(c)_{ik}$	1.657
(t value)	(9.61)*
R ²	0.6400

Data: Household Labour Force Survey, New Zealand Income Supplement HLFS/ NZIS, 2004.

(N: 48, occupation, and regional labour markets per skill level (based on a sample of 6,166)).

*significant at the 1% level.

Our results in table 2 are consistent with Mare' and Stillman 2007 analysis, which found little support for the hypothesis that migrant inflows displace the New Zealand-born of similar skills in the areas where new immigrants are settling. They conclude that both immigrant and native-born groups of similar skills tend to move to, or remain in the same areas.

We are now able to proceed to the second step of the cross-regional approach, using the following regression to analyse the impact of skilled immigrants on the native-born wages:

$$\text{Log}(w^b / w^{hs})_{ik} = a_1 + b_1 \log(s^b / s^{hs})_{ik} + u_{1ik} \quad (3)$$

¹² For the unemployed observations we assign the occupation that is most frequently observed among immigrants in the specific education level. In general, the unemployment rates in New Zealand were very low throughout the past decade. We compared this approach against using the sample of employed only with actual occupations, and an alternative random occupation assignment method. We find that these approaches give very similar results, partly reflecting the very low New Zealand unemployment rates across educational groups.

where w^s is the hourly wage of *native-born male* workers of skill level s (high skilled – with Bachelor’s degree or higher (b), relative to averagely skilled – with high school qualification (hs)) in a given labour market (region i , Occupation k). While s^j is the share of *all workers* (both native-born and immigrant) with skill level j in the regional labour force, and u_{ik} is the disturbance.¹³ It should be noted that we are using the *ratio* of high skilled to the base category (high-school graduates) wages and *fractional* shares of high skilled to base category workers (high-school graduates) in the labour market.

As noted in Card (2005), endogeneity is a potential concern if immigrants systematically choose regions with overall higher expected wage rates to settle in – a phenomenon which could result in the over-statement of wage effect estimates. Our analysis is different in this respect, as we define units of observation by occupation and geographic location, rather than by regions alone. Since movements across occupations by the native born are potentially less common, our specification has an advantage in that we expect endogeneity to be less of an issue in our specification. We directly tested for endogeneity using the Hausman and Wu Test. In a number of our specifications we could not reject the exogeneity of our supply explanatory variable. As noted, this is likely to reflect our specification approach which incorporates both occupational and regional labour market choices by qualification, thereby, reducing concerns regarding potential endogeneity in this type of analysis. Nevertheless, given the prevalence of endogeneity concerns in this literature we pursue adjustments through instrumental variables (IV) as in Card (2005), with the expectation that OLS and IV estimations may not vary significantly in our models.

Potential endogeneity is addressed here by using ‘the fraction of immigrants with a Bachelor’s or higher degree’ (s^{bl}/s^l) as an instrument for the supply of workers with a Bachelor’s or higher degree (relative to the supply of workers with a high-school qualification (s^b/s^{hs})). This instrument is directly related to the explanatory variable – the relative supply of labour force with a Bachelor’s or higher degree, but we expect that it is not directly related to the income of male natives, partly since immigrants are a small fraction of the regional/occupation markets. The result of this IV estimation (table 3) is an insignificant positive coefficient b_1 . We verify the suitability of this instrument statistically. On the question of instrumental variable relevance, the battery of tests clearly indicates the relevance of our selected IV. For example, the Cragg-Donald test significantly rejects the weak identification test in each specification (e.g. Cragg-Donald Wald F statistic of 59.0 significantly exceeds the Stock-Yogo critical value for the earnings model). Similarly, the Kleibergen-Paap test of under-identification is rejected at the 0.0001 level (Chi-Sq (1) = 15.2).¹⁴ A similar set of results are also obtained for the hourly wage models.

¹³ Assume that

$$E(\text{Log}(w^b/w^{hs})_{ik} \mid \log(s^b/s^{hs})_{ik}) = a_1 + b_1 \log(s^b/s^{hs})_{ik}$$

$$E(u_1 \mid \log(s^b/s^{hs})_{ik}) = 0 \text{ and } E(\log(s^b/s^{hs})_{ik}) = 0.$$

Also assume $u_1 \sim N(0,1)$.

¹⁴ We also conducted the Hansen J statistic over-identification test to test the validity of the instrument. Since our base model is exactly identified, we tested this hypothesis based on an auxiliary expanded specification with our initial IV (‘the fraction of immigrants with a Bachelor’s or higher degree’ (s^{bl}/s^l)), and a second IV (the share of the entire workforce with a Bachelor’s degree that are immigrants in relation to the share of the entire workforce with high school qualifications (s^{bl}/s^{hs})). This latter IV specification is also common in the literature. The over-identification hypothesis could not be rejected in each of our models (e.g. the Hansen J statistic is 0.268 with a Chi-Sq (1) p-value of 0.604 for the earnings model, with similar results in the hourly wage regressions). In addition, as expected from the tests above, the results based on these alternative IV specifications were compatible.

Our results of both OLS and IV estimation do not support the hypothesis of a negative significant relationship between immigrants with a Bachelor's or higher degree and the weekly earnings or hourly wage of natives with the similar educational qualifications. This is consistent with explanations that immigrants and the native-born are (at least for a time period) incomplete substitutes. This effect may reflect imperfect transferability of skills by immigrants (see for example, Grossman, 1982; Friedberg, 2000; Bauer, *et al.*, 2000; Borjas, 2003).¹⁵

Table 3 - The effect of high-skilled labour supply on the hourly wage and weekly earnings of high-skilled native-born

Explanatory variable	Log relative hourly earnings		Log relative weekly wage	
	OLS	IV*	OLS	IV*
High-skilled relative supply effect { $\log (s^b / s^{hs})_{ik}$ }	0.0491	0.0628	0.1124	0.2343
(t-value)	(0.93)	(0.70)	(1.62)	(1.55)
R ²	0.0151	0.0133	0.0447	0.0346

Notes: Based on equation (3): $\log (w^b / w^{hs})_{ik} = a_1 + b_1 \log (s^b / s^{hs})_{ik} + u_{1ik}$. * Instrument for s^b / s^{hs} in IV estimation is fraction of immigrants with Bachelor's or higher degree (s^{bl} / s^l).

Sample: 48 occupation and regional labour markets per skill level (based on a sample of 6,166).

Wage Effects for Less-skilled Native-born Workers

One of the potential unintended consequences of a high-skilled immigration policy is that some immigrants may not find employment in the high-skilled job market. We therefore also inspect the wage effect of increased supply of immigrants with a Bachelor's or higher degree on native-born workers that *do not have high school qualifications* (*d*) (equation (4) below).

$$\log (w^d / w^{hs})_{ik} = a_1 + c_1 \log (s^b / s^{hs})_{ik} + u_{1ik} \quad (4)$$

where w^d is the mean weekly earnings or hourly wages of male natives with less than high-school completion (similar to Card's 'dropout' category). The important change from the previous analysis, is that the dependent variable is now the wage rate of native-born male *high school dropouts* relative to the wages of high school graduates (base category); while the explanatory variable is unchanged.

While the effect of skilled immigrants on unskilled native-born workers is not commonly examined, we expect that, due to the experience of some skilled immigrants to be engaged in employment below their skill level, high skilled immigrants may in fact compete more with *unskilled* than skilled native-born workers. Evidence of this

¹⁵ Our focus in this paper is on the effects of high-skilled immigration. However, for a broader picture of potential wage effects, we also examined the effect of less-skilled immigrants on the wages of the native-born with similar (less than high-school completion) qualification. We found that the assumption of factor price equalization is also rejected for the less-skilled sample, and there are no significant effects of less-skilled immigrants on the wages or earnings of the native-born with similar qualifications. These results (available from the authors), combined with our earlier results, show no wage impacts from immigration for the native-born of similar qualification levels.

is provided in the raw data: in examining the mean qualifications of immigrants and native-born workers with higher degrees in our sample, we find that a disproportionate number of highly skilled immigrants are engaged in elementary occupations. For example, less than 0.73 per cent of the native-born male population with higher degrees is engaged in Plant and Machine Operator occupations, as compared to 4.29 per cent of immigrants with higher degrees. Likewise, while less than 1.61 per cent of the New Zealand-born male population in our sample with a Bachelor's degree or higher is engaged in Trades Occupations, 3.75 per cent of immigrants with similar education levels are employed in trades.

We offer a number of potential explanations for these observations. First, language barriers and institutional degree requirements tend to result in an imperfect transfer of immigrants' human capital. This results in incomplete substitution of high human capital immigrants and high human capital native workers. Furthermore, immigrants often have less information and limited access to labour market networks compared to native workers. Additionally, employers' misperceptions that immigrants have low human capital can result in similar outcomes (see for example, Bauer, *et al.*, 2000). A related emerging literature shows that skilled immigrants who are over-educated, as reflected by employment in occupations that require less skill than their education level permits, receive a wage penalty compared to others with the same level of education, which affects their wage assimilation over time (see for example, Green *et al.*, 2007). The use of occupational data for high-skilled immigrants and native-born provides realistic avenues for analysis of the effect of skilled immigrants on the wages of unskilled natives.¹⁶

Furthermore, these results point to the attractiveness of auxiliary settlement policies aimed at improving immigrant language proficiency, labour market integration and knowledge of employment networks. It is expected that such policy changes would effectively mitigate this downward effect on low-skilled wages from highly-skilled immigration.

The results of regression (3) are presented in table 4. The OLS and IV results indicate a small negative effect of skilled immigration on the relative wages of male natives with no qualification (less than high-school degree).¹⁷ The relative hourly wage of male natives with no qualification is 0.15 per cent lower with a one per cent increase in the relative supply of overall manual labourers with a Bachelor's degree or higher.

¹⁶ We also estimated wage and earnings effects for each occupational group separately, to determine whether the results are being driven by particular groups. We do find, despite small samples for these regressions, a negative and significant impact of highly educated immigrants on the weekly earnings and the hourly wages of the groups of lower educated Plant & machine operators & assemblers. This indicates that a disproportionate number of immigrants are competing in job markets significantly below their human capital category. One subcategory within the Plan & machine operators & assemblers groups is "Taxi drivers", which is known for employing overly skilled immigrants. In contrast, the effect of immigrants with a Bachelor or higher degree on the earnings of the groups of Professionals and trade workers with No Qualification was found to be positive. Therefore the negative and significant impact, as we have shown, is more pronounced in some occupations. (This full set of results is available from the authors).

¹⁷ Again, we statistically verified the suitability of our instrument for these models based on the Cragg-Donald F statistic for weak identification, the Kleibergen-Paap test for under-identification (at p values better than 0.001 in every case). We also conducted the Hansen J test for over-identification as noted in footnote 14, and the over-identification hypothesis could not be rejected.

Furthermore, the relative weekly earnings of unskilled locals will be reduced by approximately 0.17 per cent with one per cent increase in the relative supply of overall labourers with a Bachelor's degree or higher. Again, for instrumental variable estimation, the fraction of immigrants with a Bachelor's or higher degree in the occupation in question was also used here. The IV estimation process provided similar results to the OLS estimation process suggesting that the endogeneity problem is limited. Figures 1-2 show the insignificant wage effects corresponding to tables 3 and 4.

Table 4 - The effect of high-skilled labour supply on the hourly wage and weekly earnings of less-skilled native-born

Explanatory variable	Log relative hourly earnings		Log relative weekly wage	
	OLS	IV*	OLS	IV*
High-skilled relative supply effect { $\log(s^b / s^{hs})_{ik}$ }	-0.1459	-0.167	-0.1706	-0.1942
(t-value)	(-3.07)*	(-2.72)*	(-2.42)*	(-2.68)*
R ²	0.2134	0.1897	0.1808	0.1737

Notes: Based on equation (4): $\text{Log}(w^d / w^{hs})_{ik} = a_1 + c_1 \log(s^b / s^{hs})_{ik} + u_{1ik}$. Instrument for s^b / s^{hs} in IV estimation is fraction of immigrants with Bachelor's or higher degree (s^{bl} / s^l).

Sample: 48 occupation and regional labour markets per skill level (based on a sample of 6,166).

*: significant at the 1% level. t-statistics in brackets.

As shown above (table 4), we found that skilled immigrants have a smaller effect on the hourly wage rate than the weekly earnings of unskilled male native-born workers. This potentially implies that an influx of immigrants reduces the hours worked by natives with no qualification. Alternatively, this implies that high-skilled immigrants employed in unskilled jobs have higher equilibrium hours of work than do native workers in the same job. This may be due to factors such as aspirations for higher earnings or other personal preferences among immigrants.

5. Sensitivity Analyses

Alternative Direct Specification (Immigrant Labour Supply)

We estimated supplementary regressions to those reported in tables 3 and 4, with an alternative and more direct specification of the explanatory variable, as in some of the literature (see for example, Dustmann, *et al.*, 2005). Instead of using the ratio of the share of the entire workforce with Bachelor's degrees in relation to the share of the entire workforce with high school qualifications (s^b / s^{hs}) as our explanatory variable, we now use the ratio of the share of the entire workforce with a Bachelor's degree that are immigrants in relation to the share of the entire workforce with high school qualifications (s^{bl} / s^{hs}).

This sensitivity analysis shows that it makes little difference whether you use the total share of the workforce with Bachelor's degrees, or just the section of the workforce with Bachelor's degrees that are *immigrants*. This, in turn, suggests that any increase in supply of skilled relative to high-school degree labour is in proportion to increases in skilled immigrants, rather than being disproportionately caused by increase in the supply of New Zealand-born skilled workers (such as a surge in domestic university graduates.)

Interestingly, we find little difference in the coefficients or standard errors. For example, with this alternative specification, the estimated OLS coefficient for the weekly earnings equation for high-skilled natives is 0.16 with a t-value of 1.23, compared to its equivalent coefficient value of 0.11 with a t-value of 1.62 in table 3, column 3. We also repeated this alternative specification for the effects of skilled immigration on less skilled native workers (equivalent to table 4) and again found results that lead to similar conclusions.¹⁸

Figure 1 - Wage Effects: The effect of high-skilled immigrant supply on the weekly wage of high-skilled native-born

Explanatory variable: Overall Labour Supply with Bachelor's of Higher Degree (s^b / s^{hs})

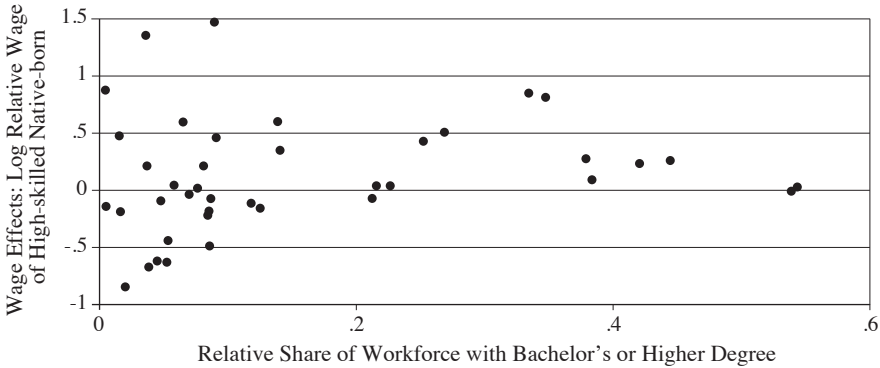
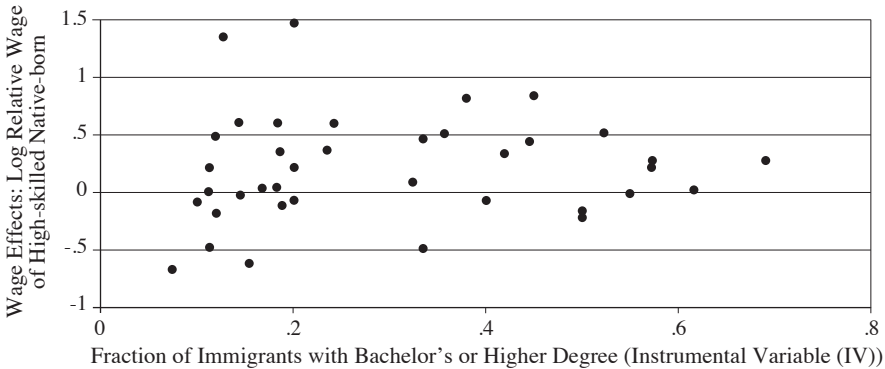


Figure 2 - Wage Effects: The effect of high-skilled immigrant supply on the weekly wage of high-skilled native-born

Instrumental Variable: Fraction of Immigrants with Bachelor's or higher degree (s^{bl} / s^l)



¹⁸ We also estimated regressions equivalent to those reported in table 4 for the less-skilled native-born, with the equivalent alternative specification of the explanatory variable (s^{bl} / s^{hs}). These results were also compatible with our OLS and IV results in table 4. The OLS coefficient for the weekly earnings equation is -0.142 for less-skilled natives with a t-value of 1.37, compared to its equivalent coefficient value of -0.171 with a t-value of -2.42 in table 4, column 3.

Expanded Age Group (25-64)

In this paper the age group includes the age group 25-54. We estimated additional models with the expanded age group 25-64 years. There is greater variation in employment and hours of work of the 55-64 age group. Nevertheless, the expanded age group allows to incorporate potential effects of skilled immigration on the wages of more mature native workers. The new estimates signify that the previous results are robust with the expanded age group. For example, the original OLS estimate of the coefficient β (the effect of changes in immigrant supply to the overall labour force in table 2) is 1.66 with a t-value of 9.61. Using a sample with the expanded age group, the new estimate is 1.70 with a corresponding t-value of 9.98. Similarly close estimates result for the other analyses in the paper. For instance, the OLS coefficient is 0.112 in column 3 of table 3, and 0.102 in the new estimates (and statistically insignificant in both cases). Broadening the age specification from 25-54 to 25-64 does not change the results in any significant way.

Change in Migration

In order to determine whether the results for 2004 are robust, we estimated supplementary difference-in-differences (DID) estimations based on 2003 and 2004 data. This DID analysis is based on the assumption that the main shock or difference across localities over the two years was the labour supply shock due to increased immigration inflow.¹⁹ The overall fraction of the population that consisted of immigrants increased significantly (1.3 per cent) between the years 2003 and 2004. This change in the share of population due to immigration is relatively large and equivalent to changes across five-year census intervals in many other countries. However, increases in immigration over this year were not uniform across regions. The greatest effect over the two year period (2003-2004) was for the largest metropolitan area (Auckland region), with an increase in the share of immigrants by 2.9 per cent. In addition, the years 2003 and 2004 represent a period when real GDP growth was positive and stable (the average real per capita growth for the period was 2.2 per cent). Therefore, these two years represent similarly active economic conditions, which supports the assumption that the main shock across the two years in each region for the DID analysis is the shock caused by the immigrant inflow. The estimations closely support our earlier results in table 3 (that high skilled immigrants have an insignificant impact on the wages of high-skilled New Zealand-born workers) and table 4 (that the coefficient for less-skilled natives has a negative sign). The DID coefficient for hourly wage effects is -0.056 compared to -0.145 in table 4, which indicates that potential effects of high-skilled immigrant supply on less-skilled wage is smaller immediately after migration, compared to the effects of the overall pool of high-skilled immigrants, as in our main discussions.

¹⁹ See for example, Woodridge (2010) on the Difference-in-Differences (DID) method.

Variation of Migrant Definition (10 years since Migration)

Our analysis defines immigrants as all foreign born workers. This specification reflects both short and long term impacts of immigration. We estimated further supplementary regressions in which we restrict the analysis to immigrants who have migrated within the last 10 years. The new estimates remain consistent with the results when there is no restriction on years since migration of immigrants. For example, in column 1 of table 3 in the paper, the coefficient on relative supply is 0.049 with a t-value of 0.93. The respective estimate when we considered immigrants that have arrived in the last decade is 0.028 with a t-value of 0.51. Both of these estimates are insignificant. Looking at the IV estimate, the relevant coefficient is 0.063 and insignificant (table 3, column 2). The comparable estimate with the new specification is 0.03 and insignificant. These results support our earlier findings. More specifically, they show that high-skilled native-born workers are not adversely affected by either the more recent (within a decade) or earlier skilled immigrants.

We observe similar effects on the relative earnings of workers with no schooling from variation in the relative supply of workers with Bachelor's or higher degree. For example, the original estimate in column 3 of table 4 is -0.171 with a t-value of -2.42 . The new estimate is -0.173 with a t-value of -2.49 . We find that there is practically no change in the results for supply effects on workers with less than high school education when we use a years since migration restriction. On the other hand, the coefficients decrease a little when we estimate the supply effects on highly skilled natives, while insignificant. Nevertheless, the estimates based on these alternative variable definitions are most comparable, and indicate that the results in this paper are robust across these specifications.

6. Conclusion

In this paper we have investigated the effect of high-skilled immigration on the wages of both high-skilled and less-skilled native-born workers across regional and occupational labour market groups in New Zealand.

The recent literature on the impact of immigrants on the wages of native workers has focussed on low-skilled workers in the US. It has produced results ranging from no impact to negative impacts on the wages and employment opportunities of native-born workers. With a trend of increasing international high-skilled migration, our study's focus on high-skilled immigration represents a less-studied but important aspect of international labour market flows. A further phenomenon studied here is the tendency of skilled immigrants to find employment in sectors below their skill level.

First, the result of our labour supply analysis does not support the hypothesis of factor price equalization: New Zealand-born workers do not move to new job markets when immigrants arrive. This indicates that immigrants and New Zealand-born workers of certain skill (qualification) levels tend to settle in similar geographic-occupational markets. A possible explanation is that skilled workers like to congregate in certain areas to enjoy the positive externalities of working alongside other highly skilled workers. In addition, changing occupation is potentially less common among the native-born workforce than immigrants who may face downward occupational movement. Our specification which incorporates occupational labour market choices

in addition to regional choices is theoretically relevant and empirically useful for the estimation of domestic wage effects. Importantly, these results reject the hypothesis that the wage effects of an increased supply of immigrants may be biased toward zero or underestimated.

Second, in response to the main question addressed in this paper, we do not find evidence of an adverse impact of highly educated immigrants on the wages or earnings of highly educated native-born workers. However, we do find a small negative effect of an increase in the relative supply of immigrants with higher educational degrees for native-born workers without high-school degrees. We estimate a 1.4 to 1.9 percentage decrease in the weekly earnings of the NZ-born workers with no qualifications, for a 10 percentage point increase in the relative share of workers with a Bachelor's degree or higher. This result is robust across OLS and IV estimations.

These results are consistent with the hypothesis that there is incomplete substitution of immigrant and native-born workers at similar education levels. This incomplete substitution may be due to immigrants' lack of language proficiency, difficulties in gaining recognition for education attained overseas, a lack of access to employment networks, and employer misperceptions of immigrants' skill levels.

Finally, our analysis separated the traditionally combined groupings of worker skill and occupation, thereby allowing us to study them independently. For example, this approach allows us to realistically examine the movement by some immigrants to occupations that require less skill. We find evidence that this greater detail in our approach lends itself to and is worthy of wider consideration.

Overall, the use of a detailed data set on New Zealand labour markets has allowed us to examine the effects of skilled immigration on the wages of native-born workers, in a controlled environment. Our study showed that skilled immigrants have little effect on the wages of locally-born skilled workers – suggesting that skilled immigrants are not perfect substitutes for skilled locally born workers. Given that our analysis showed that most highly-skilled domestic and immigrant workers are employed in similar occupations, this is a significant finding, indicating that the immigration policy has been effective in attracting highly skilled immigrants, without imposing negative wage effects on the domestic skilled labour market. Also of interest is the result that skilled migration is associated with lower wages of unskilled native workers. This further adds to the literature on the effect of immigration on wage rate of locals: previous literature on the US has found that low skilled native-born workers experienced wage reductions with increased competition from low skilled immigrant workers; while this study showed that low skilled native-born workers experience wage reductions from the high-skilled immigrant workers who face language and skill-transfer barriers, and thus end up competing with native-born less skilled workers for jobs below their skill level. This has implications for analytical design relating to skilled immigration effects. In addition, it highlights the importance of fine-tuning auxiliary settlement policies to accompany high-skilled immigration policies. Improving immigrant language proficiency, labour market integration and knowledge of employment networks would enhance the success of high-skilled immigration policies.

References

- Addison, T. and Worswick, D. (2002), 'The Impact of Immigration on the Earnings of Natives: Evidence from Australian Micro Data', *Economic Record*, 78(68-78).
- Altonji, J. and Card, D. (1991), 'The Effect Of Immigration On The Labour Market Outcome Of Less-Skilled Natives', in Abowd, J.M. and Freeman, R.B. (eds.) *Immigration, Trade and the Labor Market*, University of Chicago Press, Chicago, 201-234.
- Bauer, T.K., Lofstrom, M. and Zimmermann, K.F. (2000), 'Immigration Policy, Assimilation of Immigrants and Natives' Sentiments towards Immigrants: Evidence from 12 OECD-Countries', *IZA Discussion Paper*, 187.
- Borjas, G.J. (1987), 'Immigrants, Minorities, and Labor Market Competition', *Industrial and Labor Relations Review*, 40, 382-392.
- (2003), 'The Labor Demand Curve is Downward Sloping: Re-Examining the Impact of Immigration on the Labor Market', *The Quarterly Journal of Economics*, 118, 1335-1374.
- (2005), 'The Labor Market Impact of High-skill Immigration', *The American Economic Review*, American Economic Association, 95(2), 56-60.
- Borjas G.J., Freeman, R.B. and Katz, L. (1992), 'On the Labor Market Impacts of Immigration and Trade', in Borjas, G.J. and Freeman, R.B., (eds.) *Immigration and the Work Force: Economic Consequences for the United States and Source Areas*, University of Chicago Press, Chicago, 77-100.
- Boyd, C. (2003), 'Migrants in New Zealand: An Analysis of Labour Market Outcomes for Working Aged Migrants Using 1996 and 2001 Census Data', *Department of Labour*, Wellington.
- Card, D. (1990), 'The Impact of the Mariel Boatlift on the Miami Labor Market', *Industrial and Labor Relations Review*, 43(2), 245-257.
- (2001), 'Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration', *Journal of Labor Economics*, 19(1), 22-64.
- (2005), 'Is the New Immigration Really So Bad?', *The Economic Journal*, 115, 300-323.
- and DiNardo, J. (2000), 'Do Immigrant Inflows Lead to Native Outflows?', *American Economic Review*, 90(2), 360-367.
- D'Amuri, F., Ottaviano, G.I.P. and Peri, G. (2010), 'The Labor Market Impact of Immigration in Western Germany in the 1990s', *European Economic Review*, 54(4), 550-570.
- Dustmann, C. and Gritz, A. (2005), 'Immigration, Jobs and Wages: Theory, Evidence and Opinion', CEPR-cream publication, London.
- and Fabbri, F. and Preston, I. (2005), 'The Impact of Immigration on the British Labour Market', *The Economic Journal*, 115 (November), F324-F341.
- Friedberg, R.M. (2000) 'You Can't Take It With You? Immigrant Assimilation and the Portability of Human Capital', *Journal of Labor Economics*, 18, 221-251.
- and Hunt, J. (1995), 'The Impact of Immigrants on Host Country Wages, Employment and Growth', *The Journal of Economic Perspectives*, 9(2), 23-44.
- Glass, H. and Choy, W.K. (2001), 'Brain Drain or Brain Exchange?', *Treasury Working Paper 01/22*, New Zealand Treasury, (<http://www.treasury.govt.nz/workingpapers/>).

- Green, C., Kler, P. and Leeves, G. (2007), 'Immigrant Over Education: Evidence from Recent Arrivals to Australia', *Economics of Education Review*, 26, 420-432.
- Grossman, J. (1982), 'The Substitutability of Natives and Immigrants in Production', *Review of Economics and Statistics*, 64, 596-603.
- Jaeger, D.A. (1996), 'Skill Differences and the Effect of Immigrants on the Wages of Natives', US Bureau of Labor Statistics Working Paper, 273.
- LaLonde, R.J. and Topel, R.H. (1991), 'Labor Market Adjustments to Increased Immigration', in Abowd, J.M. and Freeman, R.B. (eds.), *Immigration, Trade and the Labor Market*, University of Chicago Press, Chicago, 167-199.
- Maré, D.C. and Stillman, S. (2007), 'The Impact of Immigration on the Geographic Mobility of New Zealanders', *Motu Working Paper*, No. 07-05, Motu Economic and Public Policy Research, Wellington.
- Poot, J. and Cochrane, B. (2004), 'Measuring the Economic Impact of Immigration: A Scoping Paper', Occasional Paper, Wellington Department of Labour.
- _ and Longhi, S. and Nijkamp, P. (2005), 'Meta-analytic Assessment of the Effect of Immigration on Wages', *Journal of Economic Surveys*, 19(3), 451-477.
- Pope, D. and Withers, G. (1993), 'Do Migrants Rob Jobs? Lessons of Australian History 1861-1991', *Journal of Economic History*, 53, 719-42.
- Merwood, P. (2007), New Zealand Department of Labour *Migration Trends 2006/2007*, www.immigration.govt.nz.
- Winter-Ebmer, R. and Zweimuler, J. (1996), 'Immigration and the Earnings of Young Native Workers', *Oxford Economic Papers*, 48, 473-91.
- Wooldridge, J.W. (2010), *Econometric analysis of Cross Section and Panel Data*, 2nd Edition, MIT press.