

Title: The Effect of Immigration on the Earnings of Native-Born Workers: Evidence from Australia

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Abstract

No consensus has been reached by previous studies on the impact of immigration on the earnings of natives. Empirical findings show that the impact of immigration is small or negligible and at times positive. Using data from the Australia's 2001 Census of Population and Housing, this paper examines the impact of immigration on earnings. An individual level earnings function is estimated, including the fraction of immigrants in a given skill group relative to total employment in that skill group as one of the independent variables. Using employees' occupation and level of education as proxies for skill, the results indicate that immigrants have a significant positive effect on earnings of natives. A negative effect is found only in low skill occupations, where the share of immigrants being overeducated is high and thus they earn more than their co-workers. The negative effect is not due to high inflow of immigrants per se, but it is a result of misallocation of skills in the labour market. The overall findings suggest that the increase in supply of labour due to immigration is offset by higher demand for labour and hence positive effect on native earnings.

1. Introduction

The impact of immigration on native wages is determined by the degree of substitution between immigrants and native-born employees. Generally, the wages of native employees become lower if immigrants compete with them in the labour market and higher if immigrants are a complement for natives. It is common to see substitution between the two groups in occupations with low-skilled employees. It is not easier for skilled immigrants to substitute native employees, especially at the time of arrival, because they lack host country specific skills. Besides, the requirement for host country's language proficiency, together with the relatively less demand for immigrants with qualifications obtained abroad, makes high-skilled immigrants less substitutable for natives in the same skill category.

No consensus has been reached by previous studies about the magnitude of the effect immigration has on earnings of natives. While some results show a large negative effect, other studies find that the effect is scant or none. There are also findings that confirm the positive effect of immigration on wages, though not many.

Most of the work on the effect of immigration on native earnings has been done based on data from USA. Using decennial census data, Borjas (2004) found a reduction in average annual earnings of native-born men by around 4%, due to increase in supply of labour through immigration. This negative effect, according to Borjas, is large for non-white employees and for those without a high school education. Another study by Borjas (2003) shows that, due to immigration, the average native-born earnings decline by around 3% and by about 9% for high school drop outs. A significant adverse effect of immigration on the earnings of least skilled native-born employees was also noted by

Borjas, Freeman and Katz (1997), Borjas and Katz (2005) and Borjas (2006). A marked reduction in the earnings of low-skilled natives was also documented by Jaeger, (1996), Camarota (1997), Schoeni, (1997) and Orrenius and Zavodny (2006).

Different from the above findings, Card (1990, 2005) showed that the measured effect of immigration inflows on the earnings of low-skilled natives was small. The same conclusion was also reached by DeFreitas and Marshall (1983), Borjas (1983, 1984), Muller and Espenshade (1985), Bean, Lowell and Taylor (1988), Lalonde and Topel (1991), Altonji and Card (1991), Butcher and Card (1991), Enchautegui (1993, 1997), Friedberg and Hunt (1995), Smith and Edmonston (1997), Grant (1998), Card and DiNardo (2000), Friedberg (2001), Lewis (2005) and Ottaviano and Peri (2006b).

Studies that estimated a positive effect of immigration on the average wage of native-born workers were documented by Ottaviano and Peri (2005a, 2005b, 2006a) and Parasnis, Fausten and Smyth (n.d.).

The few empirical findings for Australia do not give consistent results. While Withers (1986) and Pope and Withers (1993) found a limited effect, Addison and Worswick (2002) found no evidence of negative immigration effect on natives' earnings. The study by Parasnis, Fausten and Smyth (n.d.) shows that an increase in the ratio of immigrants has a significant positive effect on labour outcomes for native employees.

Generally, native-born employees who feel that their earnings are affected by immigration flows are expected to move to areas where immigrants are less concentrated (Filer, 1992; Frey, 1995, 1996; Addison and Worswick, 2002; Orrenius and Zavodny, 2006). There is a suggestion that the reduction in native-born earnings due to immigration is temporary because labour-intensive enterprises exploit the opportunity by moving to

areas with large number of immigrants, implying increase in labour demand and hence higher earnings (Altonji and Card, 1991; Hanson and Slaughter, 1999). There is also an argument that the higher demand by immigrants for goods and services has an impact on shifting the demand for labour curve to the right, which in turn leads to higher earnings.

Using individual level data, the aim of this paper is to estimate the degree to which native wages in Australia varied with the extent of immigration. In this study, occupation type and level of education are used as proxies for skill. The remainder of the paper is organized as follows. Section two discusses labour market outcome of immigrants in Australia. Section three presents the framework for estimation and the dataset are described in section four. The results are presented in section five and finally section six concludes the paper.

2. Labour market outcome of immigrants in Australia

Australia is a country of immigration. In the 2001 census, around 22% of the population was born overseas. The highest foreign-born population (27%) lives in Western Australia, whereas the lowest in Tasmania (10%). As can be seen in Table 1, the labour force participation rates of longstanding immigrants (those arrived before 1996) aged between 15 and 64 were 70.7%, a reduction of 3.4 percentage points compared with native-born. It is reported that recently arrived immigrants (those arrived between 1996 and 2001) had relatively lower labour force participation (60.1%) and higher unemployment rates (14%). Among the widely mentioned reasons are language problem and problem of qualification recognition. In addition, skilled immigrants need to have license to participate certain professions (such as physicians, lawyers, etc) which this

hampers immediate participation in the labour market. The longstanding immigrants, however, had low unemployment rates (7.4%) which this might partly be due to the acquisition of human capital relevant to the Australian market.

Table 1 Labour market structure for the age groups 15-64, 1996-2001

	Native-born	Recently arrived immigrants	Longstanding immigrants
Participation rate (%)			
1996	74.1	56.8	70.7
2001	74.6	60.1	70.5
Unemployment rate (%)			
1996	8.7	20.6	9.4
2001	7.1	14.0	7.4

Source: 1996 and 2001 Census of Population and Housing

According to occupation, the percentage of recent arrival professional immigrants was higher (23.8%) than both the native-born (18.1%) and longstanding immigrants (20.4%) who were in the same occupational category (see Table 2). This shows the significant shift from humanitarian and family immigrants to skilled immigrants. In the financial year of 2005-2006, the number of permanent additions to Australia's resident population was 179,807, of which 50.9% skill stream (DIMA, 2006). In spite of this, the foreign-born employees engaged in low skill occupations are still large in comparison to native-born. The 2001 census data shows that around 12.5% of the employed recently arrived immigrants were labourers and related workers. This is a large percentage in comparison with 8.4% for native-born and 9.6% for longstanding immigrants. The large participation rates of immigrants, especially recent arrivals, in low skilled occupations are due to arrivals under humanitarian and family program.

Table 2 Percentage distribution of labour force by occupation, 2001

	Native-born	Recently arrived immigrants	Longstanding immigrants
Managers and Administrators	9.3	8.0	8.7
Professionals	18.1	23.8	20.4
Associate Professionals	12.0	10.2	12.5
Tradespersons and Related Workers	12.7	9.8	12.3
Advanced Clerical and Service Workers	3.9	2.5	3.6
Intermediate Clerical, Sales and Service Workers	17.4	16.0	15.6
Intermediate Production and Transport	8.0	7.5	9.3
Elementary Clerical, Sales and Service Workers	10.2	9.7	8.0
Labourers and Related Workers	8.4	12.5	9.6

Note: Data apply for age groups 15-64

Source: 2001 Census of Population and Housing

As mentioned above, Australia has shifted toward welcoming more skilled immigration. Recent immigrants have a significant more skilled profile than both longstanding immigrants and native-born. Indicators from the 2001 census show that the percentage of people with higher degree was 1.4% for Australian-born, 5.9% for recently arrived immigrants and 2.8% for longstanding immigrants (see Table 3). The percentage of people with no qualification was 56.7%, 45% and 53.2% respectively. This shows the nature of selectivity of immigration policy in Australia.

Table 3 Percentage of persons by selected level of education, 2001

Level of education	Native-born	Recently arrived immigrants	Longstanding immigrants
Higher degree	1.4	5.9	2.8
Postgraduate diploma	1.5	1.2	1.3
Bachelor degree	9.5	18.6	11.0
Associate diploma	5.9	9.7	6.7
No qualification	56.7	45.0	53.2

Note: Data apply for persons aged 15 and over. Data do not include all types of qualifications

Source: 2001 Census of Population and Housing

In terms of income from employment, recently arrived immigrants from English-speaking countries are in a better position with 38.2% earning more than \$700 a week, compared to 28.9% of the longstanding immigrants from English-speaking countries, 24.7% of the Australian-born, and 20.8% and 12.5% respectively of the non-English speaking recent and longstanding immigrants (2001 Census of Population and Housing).

3. Methodology

There are at least three approaches used by previous studies to estimate the labour market impact of immigration. The spatial approach examines the impact of immigration by comparing wage changes with immigrant inflows across local labour markets within the host country (Altonji and Card, 1991; Lalonde and Topel, 1991; Card and DiNardo, 2000; Card, 2001; Lewis, 2005). Such approach assumes each geographical clustering as a discrete labour market and thus comparisons are made across local labour markets to find the impact of immigration. One of the limitations of this methodology is that it does not take account of internal migration that could be made by native-born workers to adjust for the possible wage reduction due to immigration. The model, therefore, does not capture the mobility of labour between areas. Besides, the exchange of goods and services between areas implies that labour markets of different geographical areas are

interconnected and thus the impact of immigration should be seen from national perspectives.

Another methodology to assess the effect of immigration using national data concentrates much on the impact on low-skilled native-born workers (Borjas, Freeman and Katz, 1992, 1996, 1997; Borjas, 1993; Jaeger, 1996). However, the national factor proportions analyses, which estimate the impact of immigration on the change in the supply of different skill groups, cannot directly estimate the responsiveness of natives' wages and thus it might give overstated results (Levine, 2006). This approach is also criticized for its heavy reliance on assumptions used to estimate the counterfactuals (Murray, Batalova and Fix, 2006).

The third approach focuses on the effect of immigration within occupations or skill groups (Camarota, 1997; Friedberg, 2001; Borjas, 2003; Orrenius and Zavodny, 2006). This method relates occupational or skill differences in the share of employment of immigrants to the earnings of native-born workers.

This paper follows the third approach to estimate the impact of immigration on native wages. In this study, the immigration variable is generated by separately computing immigrant share by occupational group and by level of educational attainment. The coefficient on immigration variable, as a response variable in the log earnings model, estimates the degree to which native wage varied with the extent of immigrants in the particular skill group. The economic analysis is based on the individual level data shown by Friedberg (2001). An individual-level earnings function can be estimated by including a measure of immigration as one of the explanatory variables:

$$\ln w_{ij} = X_i \beta_i + I_j \alpha + \varepsilon_i,$$

where $\ln w_{ij}$ is the log earnings of individual i in a particular j skill group, X_i is a vector of individual-level variables, such as worker's age, level of education, occupation, gender, marital status, industry sector, hours worked, industry of employment, etc., I_i is the ratio of immigrant to native employees in the individual's skill group and ε_i is the error term.

To see the impact of immigration on native earnings by skill group, occupation and level of education are taken as proxies for skill. Thus, a separate regression is done, one by taking the ratio of immigrant to native workers in the individual's occupation and the other by taking the fraction of immigrant in the individual's skill groups defined in terms of educational level attained. Relative to the cross sectional approach, using individual level data has the advantage of added efficiency (Friedberg, 2001).

Though the cross-sectional data used in this paper could not address the duration effect of the impact of immigration on native earnings, it has the advantage over the spatial approach. There is a concern of endogeneity bias because the distribution of immigrants across occupations might not be independent of the error term. However, this is less of a problem in the short-run as any occupation cannot be freely chosen by immigrants (Friedberg, 2001). Endogeneity problem might arise in the long-run, when immigrants obtain host country specific skills and thus their occupational choice depends on occupational wage.

4. Data

The analysis uses data from the 2001 Census of Population and Housing in Australia, which is the largest statistical collection undertaken by the Australian Bureau of Statistics

(ABS). The Household Sample File, which consists of individual statistical records, represents 1% sample of the 2001 Census full unit record database. The study is restricted to employees aged 15-64. After excluding observations for which some the key variables included in the model were either not stated or inadequately described, the sample size reduced to 54241, of which around 23% are immigrants. A person is classified as immigrant, if born outside Australia; all other employees are classified as natives.

On average, immigrants are 5.2 years older and 5.7% have completed a postgraduate degree level, compared to 2% for native-born. With 81.7% for immigrants and 78.8% for natives, almost four out of five employees work with the private sector. On average, two out of nine employees in each individual's occupation are immigrants (see Table 4). As can be seen from the Table below, immigrants earn more in each individual's occupation. It is worth noting that the earnings differential is higher for low-skilled occupations.

Table 4 Percentage of immigrants and mean log weekly earnings by each individual's occupation

Occupational categories	% of immigrants	Immigrants' log weekly earnings	Natives' log weekly earnings
Managers and Administrators	24.1	7.0846	7.0261
Professionals	25.6	6.8014	6.7213
Associate Professionals	22.1	6.6369	6.5911
Tradespersons and Related Workers	20.1	6.4695	6.3619
Advanced Clerical and Service Workers	21.5	6.3551	6.3196
Intermediate Clerical, Sales and Service Workers	21.2	6.1732	6.1103
Intermediate Production and Transport Workers	25.2	6.3227	6.2682
Elementary Clerical, Sales and Service Workers	18.6	5.7982	5.5060
Labourers and Related Workers	25.6	6.4321	5.8395
Mean	22.67	6.4321	6.3016

By level of education, 27.4% of immigrants had bachelor or higher qualifications, compared with 19.2% for native-born. Unlike earnings by occupation, natives with diploma or higher earn more than immigrants. However, immigrants with no qualification earn much higher than natives with the same level of education. On average, immigrants' log weekly earnings are higher by 0.1305 percentage points.

Table 5 Percentage of immigrants and mean log weekly earnings by each individual's educational level

Educational level	% of immigrants	Immigrants' log weekly earnings	Natives' log weekly earnings
Postgraduate degree	45.23	7.1009	7.1370
Graduate diploma and graduate certificate	20.44	6.7712	6.8401
Bachelor degree	28.03	6.7388	6.7640
Advanced diploma and diploma	25.77	6.5119	6.5666
Certificate	20.66	6.4581	6.4478
No qualification	20.14	6.1791	6.0125
Mean	22.69	6.4321	6.3016

Note: Generally, immigrants with no qualification work more hours than their native-born counterparts.

For all the variables included in the model Table 6 shows the mean and standard deviation figures. The original data for earnings and partly for age and hours worked was in categorical order. For simplicity, adjustments are made by taking the midpoints of each interval. Following Chiswick and Miller (1995), Preston (1997) and Kler (2005) the upper limit for weekly earnings, which is open ended, is given a value of 1.5 times the lower threshold level.

Table 6 Descriptive Statistics

Variable	Description	Mean	Std. Dev
Lnw	Log weekly earnings (Dependent variable)	6.3312	0.78698
Age	Age	36.6684	12.10749
Gender	Dummy variable = 1, if male	0.52	0.499
Mas	Marital status = 1, if married	0.5022	0.5000
Edu	Postgraduate degree (reference group)	0.0288	0.16719
	Graduate diploma and graduate certificate	0.0244	0.15415
	Bachelor degree	0.1581	0.36485
	Advanced diploma and diploma	0.0831	0.27597
	Certificate	0.2029	0.40217
	No qualification	0.5028	0.50000
Fedu	Fraction of immigrant in each individual's education level	0.2267	0.04914
Occ	Managers and administrators (reference group)	0.0697	0.25469
	Professionals	0.1991	0.39929
	Associate professionals	0.1109	0.31398
	Tradespersons and related workers	0.1147	0.31870
	Advanced clerical and service workers	0.0353	0.18455
	Intermediate clerical, sales and service workers	0.1902	0.39250
	Intermediate production and transport workers	0.0830	0.27586
	Elementary clerical, sales and service workers	0.1086	0.31113
Labourers and related workers	0.0885	0.28401	
Focc	Fraction of immigrant in each individual's occupation	0.2270	0.02489
Insec	Industry sector = 1, if working in the government sector	0.2057	0.40420
Pse	Proficiency in spoken English = 1, if not well/not at all	0.0095	0.09679
Lho	Language spoken at home =1, if English	0.8707	0.33559
Iem (Industry of employment)	Agriculture (reference group)	0.0199	0.13970
	Mining	0.0100	0.09937
	Manufacturing	0.1321	0.33856
	Electricity	0.0098	0.09837
	Construction	0.0485	0.21491
	Whole sale trade	0.0557	0.22941
	Retail trade	0.1518	0.35885
	Accommodation	0.0525	0.22308
	Transport	0.0420	0.20050
	Communication	0.0196	0.13868
	Finance	0.0431	0.20305
	Property	0.1066	0.30863
	Government	0.0544	0.22689
	Education	0.0890	0.28471
	Health	0.1053	0.30700
Culture	0.0240	0.15312	
Personal	0.0356	0.18529	
Hwo (hours worked)	1-15 hours	0.1124	0.31585
	16-24	0.0928	0.29014
	25-34	0.0992	0.29892
	35-39	0.1932	0.39478
	40	0.2052	0.40387
	41-48	0.1349	0.34160
	49 or more (reference group)	0.1624	0.36879

5. Results

The results presented in Table 7 shows that immigration has a strong positive impact on weekly earnings. On average, a 1% increase in the size of the skill group increases weekly earnings by about 1.5%. A negative impact of immigration is found in low skill occupations. One of the main reasons for this is that a large number of immigrants with higher qualifications work in low skill occupations. In the Australian labour market, immigrants mainly from non-English speaking countries have difficulty, despite being qualified (Flatau, Petridis and Wood, 1995; Green, Kler and Leeves, 2004; Kler, 2006). As stated by Liebig (2007) around 40% of employed highly qualified immigrants from non-OECD countries work in low- and medium skilled jobs, implying that these employees are overqualified. Generally, overeducated employees earn more than co-workers but less than workers with the same levels of schooling holding jobs that demand the level of schooling they have obtained.

Table 7 Impact on native-born earnings when the share of immigrants in each individual's skill increases by 1%

Proxy for skill	Percentage effect
Occupation	
Pooled	1.394 (0.095)
Low skill occupations	-0.934 (0.189)
High skill occupations	2.309 (0.245)
Education	
Pooled	1.657 (0.047)
Low skill (in terms of education)	4.544 (0.120)
High skill (in terms of education)	1.219 (0.050)

Note: In terms of education, low skill employees are those with no non-school qualifications and high skill with non-school qualifications. High skill occupations are occupations that include managers and administrators, professionals and assistant professionals. Low skill occupations are defined as those employees whose occupation code assigned is elementary clerical, sales and service workers and labourers and related workers. All are significant at 1% level and standard errors are in parentheses. The regressions control for all the variables indicated in Table 6.

The empirical results are also supported by the descriptive statistics which show that around 3.9% of immigrants in low skill occupations had bachelor or higher qualifications, compared with only 2.6% for natives in the same occupation. Thus, the negative effect is not due to a higher fraction of immigrants in low skill occupation but rather because of misallocation of resources in the labour market.

Using education as proxy for skill, the large positive effect of immigration on the earnings of low skilled native employees can partly be described by Australia's immigrant selectivity policy, which indirectly protects low skilled native employees from competition in the labour market.

The findings that immigration has a significant positive effect on earnings of natives appear to contradict the basic neoclassical theory, which says that real wages tend to decrease with the inflow of immigrants. But, there is a good reason to suggest that the downward effect on earnings is offset by high demand for labour attributable to increased aggregate demand for goods and services by immigrants and addition of capital brought in by immigrants (Addison and Worswick, 2002, Orrenius and Zavodny, 2006).

6 Conclusions

The empirical analysis uses data drawn from the Australia's 2001 Census of Population and Housing. The findings reported show that there is no adverse effect on earnings of natives due to immigration. To the contrary, immigrants have a positive impact on the earnings of natives. The only negative effect found is in low skill occupations, where a large number of immigrants are overeducated and thus earn more than their co-workers. This indicates mismatch in the labour market rather than a pure negative effect.

Australia's selective immigration policy indirectly helps low skilled native employees against stiffer labour market competition from immigrants with the same level of education.

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