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**OCCUPATIONAL ATTAINMENT AND IMMIGRANT ECONOMIC
PROGRESS IN AUSTRALIA**

by

**Barry R. Chiswick
Department of Economics
University of Illinois at Chicago
&
IZA-Institute for the Study of Labor**

and

**Paul W. Miller
Business School
University of Western Australia**

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ABSTRACT

This paper augments a conventional human capital earnings function with information on occupations. It also estimates models of occupational attainment. The results from both the earnings function and model of occupational attainment indicate that the limited international transferability of human capital skills results in immigrants being channelled into relatively low status occupations when they first enter the Australian labour market. Comparison with similar research for the US suggests that the different immigrant selection regimes (family reunion in the US, skill-based immigration and selection via a points test in Australia) do not impact on this negative association between occupational status and pre-immigration labour market experience. The attention of both policy makers and academic researchers needs to be focussed on immigrants' occupational outcomes at the time of labour market entry in the destination country.

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I. INTRODUCTION

Immigrants' labour market outcomes are generally discussed around three key concepts—the less-than-perfect international transferability of the human capital skills they acquired in their country of origin, the positive selectivity of immigrants for labour market success, especially economic immigrants, and their relatively rapid economic progress in the destination country.¹ The less-than-perfect international transferability of human capital skills results in immigrants being at an economic disadvantage during their first year in the destination country. Immigrants' rapid economic progress, particularly in the immediate post-arrival period, results in a narrowing of this gap and, especially for economic immigrants, can result in a “catch-up” of their economic position compared to that of their native-born counterparts (Chiswick, 1978). This catch-up will occur when the effects of positive selection more than off-set the lingering effects of imperfect skill transferability.

Most analyses of immigrants' labour market outcomes that have attempted to quantify these concepts have been based on cross-sectional data, though there are a number of longitudinal studies. The patterns in most, though not all, data sets are consistent with the stereotype described above. However, after almost three decades of intensive research, understanding of the process of immigrant labour market adjustment that gives rise to these patterns is still far from complete.

In a recent study, Chiswick and Miller (2007) argue that insights into the labour market adjustment of immigrants can be gained through estimation of earnings equations that take account of occupational mobility. Comparison of earnings equations that include controls for occupation with simpler specifications that eschew information on occupation shows the role that occupation of employment has as an intermediary between immigrants' human capital skills and their earnings. Thus immigrants' earnings gains in the destination country are able to be attributed to either inter-occupational or intra-occupational mobility.

¹ Positive selectivity can arise from the supply side (incentives for migration) or the demand side (criteria for allocating visas) of the market for immigrants.

The analyses by Chiswick and Miller (2007) for the US labour market revealed that around 50 percent of the earnings gains associated with years of schooling were obtained through inter-occupational mobility. The balance of the increase in earnings with additional years of schooling came about through intra-occupational earnings increases. The apportionment of the payoff from schooling to inter-occupational and intra-occupational effects for immigrants favoured inter-occupational mobility more than that for the native born, with the split being 57:43 for immigrants, and 45:55 for the native born in the most comprehensive account of occupational effects presented by Chiswick and Miller (2007).

When occupation was held constant, there was little change in the payoff to US labour market experience for either the native born or the foreign born. That is, labour market experience in the US, among either the native born or the foreign born, is associated with higher earnings almost entirely due to its impact on the growth in earnings within occupations, with inter-occupational mobility having little impact. Note that labour market experience in the US is a post-migration characteristic, in contrast to formal schooling which is largely a pre-migration characteristic.

There was, however, a large increase in the effect on earnings in the US of pre-immigration labour market experience for the foreign born once account is taken of occupation of employment. Hence pre-immigration labour market experience must be associated with drops in occupational status upon arrival in the US. Thus, pre-migration human capital (formal schooling, pre-migration experience) plays a different role in the labour market than post-migration human capital (duration in the destination).

These implications for occupational outcomes derived from analyses of earnings controlling for occupation fixed effects were confirmed through estimation of models of occupational attainment. The findings from this exercise revealed that years of schooling, and, among the foreign born, proficiency in English, are the key factors determining access to the better (high-paying) occupations. Labour market experience has little impact on occupational outcomes among the native born. However,

evaluated at 10 years, foreign labour market experience has a modest, negative impact on current occupational status.

It is not yet established whether the findings from the Chiswick and Miller (2007) study are unique to the circumstances of the US labour market or carry over to other labour markets. This issue is addressed in the current study by conducting a set of analyses parallel to Chiswick and Miller (2007) using data for Australia.

Study of the links between occupational attainment and immigrant labour market progress for countries other than the US is important to the extent that findings may be sensitive to the visa mix of the migrant flows. Immigration to the US is dominated by family based migration. For example, in fiscal year 2005 for the US there were about 472,000 permanent resident visas issued under the provisions for family sponsorship and over 46,000 issued by lottery, but only about 247,000 issued under employed-based categories.² This compares with the situation in Australia, where there is much greater emphasis on skill-based (employment) immigration. For example, the current (2006-2007) immigration planning levels in Australia are for around 46,000 family-based immigrants and close to 100,000 skill-based immigrants. While the research by Miller (1999, pp.195-196) and Duleep and Regets (1996) shows that differences in labour market outcomes across migration categories “appear to reflect the underlying characteristics of the immigrants rather than immigrant category effects per se”, these analyses do not focus on the links between pre-immigration experience and occupational attainment, which is the focus of Chiswick and Miller (2007) and the current study. Moreover, to the extent that different immigration regimes result in a different mix of family-based and skill-based visas, the overall skill level of immigrants will vary.

The structure of this paper is as follows. Section II reviews the data from the 2001 Australian Census of Population and Housing that is used in the statistical analyses, with a special emphasis on the information on occupation. It also outlines the specification of the estimating equation. Empirical results from the analysis of earnings are presented in Section III. Section IV provides information on the

² US Department of Homeland Security (2006), Table 6, page 18.

determinants of occupational attainment that assists in the explanation of the findings reported in Section III. A summary and conclusion are provided in Section V.

II. DATA AND EARNINGS EQUATION

The data used below are from the 2001 Census of Population and Housing (see Australian Bureau of Statistics, 2003). The unit record Census data file released by the Australian Bureau of Statistics (ABS) contains information on an individual's personal and employment circumstances for a one percent sample of households in Australia. The characteristics of individuals collected are standard for census data, and include region of residence, age, birthplace, educational attainment, marital status, religion, current employment status, earnings and details of any employment. The method of presentation of the data is distinguished, however, by the use of a limited number of categories for some variables (for example, only 6 categories for period of arrival in Australia among the foreign born). These data are made available to researchers in two versions of Confidentialized Unit Record Files (CURF): Basic and Expanded. Basic CURF contains less detailed data that are available for analysis on CD-ROM or accessed through the Remote Access Data Laboratory (RADL).³ The Expanded CURF has more detailed data, is available only through the RADL, and is used in the analyses presented below.

The information on occupation is coded according to the Australian Standard Classification of Occupations (ASCO), second edition.⁴ This is a skill-based classification, with two criteria guiding the classification, skill level and skill specialisation. The skill level of an occupation rises with the range and complexity of the set of tasks associated with the job. Skill level is assessed on the basis of formal education/training and previous experience "usually required for entry to an occupation". Skill specialisation depends on the field of knowledge required, tools and equipment used, materials worked on and goods and services provided.

³ The RADL is an on-line database query system, under which microdata are held on a server at the Australian Bureau of Statistics (ABS) in Canberra. Registered users are able to submit programs (*e.g.*, SAS, SPSS) to interrogate, analyze, model, *etc.* the data.

⁴ See Australian Bureau of Statistics (1997).

The classification system in ASCO involves Major Groups (9), Sub-Major Groups (35), Minor Groups (81), Unit Groups (340) and Occupations (986). This may be illustrated using one of the examples from Australian Bureau of Statistics (1997). Hence the occupation “Carpenter and Joiner” is in the Unit Group “Carpentry and Joinery Tradespersons”, and this is in the Minor Group “Structural Construction Tradespersons”. This Minor Group is in the Sub-Major Group “Construction Tradespersons”, and, in turn, this is in the Major Group “Tradespersons and Related Workers”.

Sample size considerations dictate the presentation of the data in the one percent public use samples. Hence, only 44 occupational categories are distinguished.⁵ These are used in two forms in the analyses. First, the 44 occupational categories are aggregated into the nine ASCO Major Groups. Second, the 44 separate occupational categories employed in the Census classification are used as the basis of the empirical investigation. Due to the 15-fold difference in population size, this level of detail is less than that utilised in the comparator research for the US by Chiswick and Miller (2007), where the aggregate-level analysis was based on 23 occupational categories, and the more disaggregated analysis on around 500 occupations.

The earnings function initially estimated takes the following form:

$$\ln Y_i = Z_i \beta + \varepsilon_i \quad (1)$$

where the dependent variable is the natural logarithm of weekly earnings, Z_i is a vector of the individual and job-related characteristics that affect the earnings of individual i , ε_i is the error term, and β is a vector of parameters to be estimated. The variables considered in Z consist of educational attainment, labour market experience and its square, government employment, marital status, birthplace (Australia or foreign born), duration of residence for immigrants and English language proficiency. The analyses are restricted to males aged 20-64 who were employed on a full-time basis (*i.e.*, they worked 35 or more hours per week) in the week before Census night and who reported positive weekly earnings. Appendix B contains definitions of all variables and a table of means and standard deviations.

⁵ The Census occupation classification is provided in Appendix A.

The estimates obtained from equation (1) provide a benchmark set of results that are generally viewed as offering an assessment of the links between productivity related characteristics and earnings. These links incorporate differences in earnings obtained within an occupation, and differences in earnings obtained through occupational mobility.

Two extensions of equation (1) are considered. The first of these involves augmentation with dichotomous variables for the Major Group occupations. Eight dichotomous variables are considered, with Managers and Administrators as the benchmark group. The second extension involves including dichotomous variables for each of the 44 occupations included in the Census classification.

Each of these extensions controls for the occupational earnings structure, albeit at different levels of detail. The coefficients on the variables for occupation provide information on the effect on earnings of employment in the particular occupation. This is a direct effect of occupation on earnings.

The changes in the coefficients of other variables (*e.g.*, educational attainment, labour market experience) following the addition of the variables for occupation reveal an indirect effect of occupation on earnings: some of the earnings increments associated with additional years of schooling, for example, come about because the extra schooling results in access to a higher paying occupation. Hence, comparison of the estimates in the equation with the occupation variables with those from the benchmark equation (1) will inform on the indirect channel of influence that occupation has in the earnings determination process.

III. ANALYSIS FOR EARNINGS

The results from these analyses are presented in Table 1. This table has separate panels for the Australian born, immigrants from English-speaking countries and immigrants from non-English-speaking countries.

Table 1
Estimates of Earnings Functions by Birthplace, Males Aged 20-64 Years, 2001^(a)

Variables	Australian Born			Foreign Born					
				English-Speaking Countries			Non-English-Speaking Countries		
	(i) ^(b)	(ii)	(iii)	(i) ^(b)	(ii)	(iii)	(i) ^(b)	(ii)	(iii)
Constant	1.403 (58.13)	1.721 (49.28)	2.022 (36.97)	1.559 (24.91)	2.237 (28.24)	2.153 (15.12)	1.944 (30.68)	2.422 (31.12)	2.468 (22.30)
Education	0.088 (52.41)	0.067 (31.36)	0.052 (24.71)	0.081 (22.37)	0.050 (11.57)	0.046 (10.87)	0.058 (16.84)	0.031 (7.82)	0.020 (5.22)
Experience	0.028 (22.79)	0.027 (21.05)	0.026 (21.89)	0.029 (8.53)	0.025 (7.63)	0.026 (8.13)	0.008 (2.70)	0.011 (3.68)	0.014 (4.84)
Experience Squared/100	-0.047 (17.86)	-0.048 (18.45)	-0.044 (17.65)	-0.051 (7.49)	-0.046 (6.93)	-0.047 (7.26)	-0.015 (2.46)	-0.022 (3.71)	-0.027 (4.69)
Married	0.097 (12.11)	0.088 (11.13)	0.083 (10.83)	0.151 (7.05)	0.125 (6.08)	0.109 (5.37)	0.100 (4.97)	0.093 (4.82)	0.086 (4.69)
Government	0.150 (19.20)	0.135 (17.32)	0.116 (14.43)	0.106 (4.91)	0.091 (4.42)	0.109 (4.75)	0.162 (7.66)	0.154 (7.33)	0.145 (6.74)
Speaks English: ^(d)									
Very Well	(c)	(c)	(c)	(c)	(c)	(c)	-0.030 (1.35)	-0.021 (1.01)	-0.021 (1.04)
Well	(c)	(c)	(c)	(c)	(c)	(c)	-0.135 (5.50)	-0.086 (3.51)	-0.066 (2.79)
Not Well	(c)	(c)	(c)	(c)	(c)	(c)	-0.226 (6.90)	-0.183 (5.60)	-0.152 (4.86)
Not at All	(c)	(c)	(c)	(c)	(c)	(c)	-0.421 (4.89)	-0.397 (4.84)	-0.312 (3.70)
Year of Arrival: ^(d)									

1991-1995	(c)	(c)	(c)	-0.040 (0.92)	-0.033 (0.81)	-0.030 (0.76)	0.011 (0.32)	0.025 (0.75)	0.012 (0.39)
1986-1990	(c)	(c)	(c)	-0.055 (1.58)	-0.030 (0.92)	-0.026 (0.85)	0.031 (0.99)	0.039 (1.31)	0.030 (1.04)
Before 1986	(c)	(c)	(c)	-0.085 (3.31)	-0.077 (3.25)	-0.069 (3.05)	0.107 (3.65)	0.100 (3.56)	0.083 (3.06)
Occupation ^(e)	NI	INC	INC	NI	INC	INC	NI	INC	INC
\bar{R}^2	0.190	0.210	0.291	0.194	0.256	0.306	0.168	0.223	0.300
Sample Size	20,709	20,709	20,709	3,127	3,127	3,127	3,752	3,752	3,752

Notes: (a) Heteroscedasticity-consistent ‘t’ statistics in parentheses; (b) specification (i) is the benchmark model that does not contain information on occupation, specification (ii) contains dichotomous variables for the Major Group occupations while specification (iii) contains dichotomous variables for the more detailed (44) Census occupational categories; (c) = Variables not entered; (d) = The omitted category for the Speaks English variable is “Speaks only English” and that for the Year of Arrival variable is “After 1995”; (e) NI = Occupation Not Included, INC = Occupation Included.

Source: 2001 Australian Census of Population and Housing.

Table 2
Payoffs to Selected Characteristics from Analysis of Earnings, by Birthplace,
Males Aged 20-64, 2001

Variable	Payoffs from Earnings Function			% Change	
	Standard	Controlling for 9 Occupations	Controlling for 44 Occupations	With 9 Occupations	With 44 Occupations
<u>A. Australian Born</u>					
Educational Attainment	8.8	6.7	5.2	-23.9	-40.9
Experience					
- 10 years	1.86	1.74	1.72	-6.5	-7.5
- 20 years	0.92	0.78	0.84	-15.2	-8.7
<u>B. Overseas Born, English-speaking Countries</u>					
Educational Attainment	8.1	5.0	4.6	-38.3	-43.2
Pre-Immigration Experience					
- 10 years	1.88	1.58	1.66	-16.0	-11.7
- 20 years	0.86	0.66	0.72	-23.3	-16.3
Migrated Before 1986	-8.5	-7.7	-6.9	9.4	18.8
<u>C. Overseas Born, non-English-speaking Countries</u>					
Educational Attainment	5.8	3.1	2.0	-46.6	-65.5
Pre-Immigration Experience					
- 10 years	0.5	0.66	0.86	32.0	72.0
- 20 years	0.2	0.22	0.32	10.0	60.0
Migrated Before 1986	10.7	10.0	8.3	-6.5	-22.4
Speaks English					
Well	-13.5	-8.6	-6.6	-36.3	-51.1
Not Well	-22.6	-18.3	-15.2	-19.0	-32.7
Not at All	-42.1	-39.7	-31.2	-5.7	-25.9

Source: Authors' calculations based on Table 1.

The main implications of the results presented in Table 1 are summarized in Table 2. This presents the payoffs from the earnings function to selected characteristics for each birthplace group for the three specifications of the earnings function. It also contains information on the percentage change in the various payoffs from the models

that contain variables for occupation compared to the respective payoffs in the benchmark model that does not include the information on occupation.

The first point of note is that the payoff to years of schooling falls by between 24 and 47 percent when the occupational earnings structure is taken into account at the major group level (9 occupational categories). The largest fall is for immigrants from non-English-speaking countries, and the smallest is for the Australian born. Immigrants from English-speaking countries occupy an intermediate position. For immigrants from non-English-speaking countries, these results indicate that almost one-half of the increase in earnings associated with each extra year of schooling comes about through this foreign-born group gaining access to higher paying occupations.

There are further reductions in the payoff to schooling when the finer degree of detail on occupation is included in the estimating equation. Among the Australian born, the payoff to schooling falls by 41 percent, from 8.8 percent to 5.2 percent. The change in the payoff to schooling for the foreign born from English-speaking countries is similar: it falls from 8.1 percent to 4.6 percent, a 43 percent reduction. In other words, slightly more than 40 percent of the increments in earnings associated with extra years of schooling for these groups derives from inter-occupational earnings mobility, and slightly less than 60 percent derives from increases in earnings within occupations.

Among immigrants from non-English-speaking countries, however, the payoff to schooling falls from 5.8 to 2.0 percent when account is taken of employment in the 44 occupations. This is a 66 percent reduction in the payoff to schooling. In other words, two-thirds of the payoff to schooling for immigrants from non-English-speaking countries is associated with access to higher paying occupations. Schooling is indicated here as being of far greater importance for earnings via occupational mobility for immigrants from non-English-speaking countries than it is for immigrants educated in English-speaking countries, whether in Australia or elsewhere.

There is minimal change to the payoff to labour market experience for the Australian born, with the reduction ranging from 7 to 15 percent. This implies that labour market experience has only a modest impact on occupational status. The control for

occupation has a slightly greater impact on the payoff to experience for immigrants from English-speaking countries. This ranges from 12 to 23 percent. Among immigrants from non-English-speaking countries, the pattern of effects is different, with the payoff to pre-immigration labour market experience rising once account is taken of occupation. Evaluated at 10 years, the payoff to pre-immigration labour market experience rises from 0.5 percent per year in the benchmark model, to 0.66 percent (a 32 percent increase) following control for Major Group occupation. It rises further to 0.86 percent (a 72 percent increase over the benchmark model) when dichotomous variables for the 44 Census occupations are included in the model.

The cohort effects have opposite patterns for the two groups of immigrants. Immigrants from English-speaking countries who arrived in the past five years are shown to have relatively high earnings, though their earnings position only differs significantly from the group who arrived before 1986. In comparison, immigrants from non-English-speaking countries who arrived before 1986 are shown to have significantly greater earnings than recent arrivals. This earnings advantage falls by between 7 and 22 percent once occupation is held constant.

Finally, it is seen that there are pronounced changes to the earnings effects associated with English proficiency following the incorporation of information on occupation into the earnings equation. The changes range from 6 to 36 percent when the information on Major Group occupation is used, and from 26 to 51 percent when the information on all 44 Census occupational categories is used.

These changes in the estimated effects as the earnings equation is augmented with information on occupation follow the pattern established for the US labour market by Chiswick and Miller (2007). Comparison of Table 2 for Australia and Table 3 for the US reveals that the changes in the effects of educational attainment on earnings following standardisation for occupation are broadly the same in Australia and the United States. The relative magnitude of the changes in Australia and the United States are hard to assess, given the different degrees of detail on occupation, but it appears that inter-occupational earnings mobility is of greater importance in gaining a payoff to education in Australia than in the US. This may follow from the more centralised system of wage determination, and perhaps greater union power, in

Australia than in the US, and the more egalitarian distribution of earnings within each occupation that results from these factors (see Miller, Mulvey and Martin, 1995). Hence, in order to gain pay increases in Australia, there needs to be greater emphasis on inter-occupational mobility.

Table 3
Payoffs to Selected Characteristics from Analysis of Earnings, by Birthplace,
Males Aged 25-64, 2000 US Census

Variable	Payoffs from Earnings Function		% Change		
	Standard	Controlling for 23 Occupations	Controlling for 509 Occupations	With 23 Occupations	With 509 Occupations
<u>A. US Born</u>					
Educational Attainment	10.6	8.2	5.8	-23	-45
Experience					
- 10 years	2.16	2.16	2.10	0	-3
- 20 years	1.02	1.02	1.00	0	-2
<u>B. Foreign Born</u>					
Educational Attainment	5.3	3.2	2.3	-40	-57
Pre-Immigration Experience					
- 10 years	0.88	1.24	1.30	+41	+48
- 20 years	0.56	0.68	0.70	+21	+25
Years Since Migration					
-10 years	0.88	0.96	0.92	+9	+5
-20 years	0.66	0.72	0.64	+9	-3
Speaks English					
Very Well	-8.0	-7.1	-5.7	-11.3	-28.8
Well	-26.1	-17.7	-13.4	-32.2	-48.7
Not Well	-37.3	-26.9	-21.7	-27.9	-41.8
Not at All	-37.8	-30.0	-25.2	-20.6	-33.3

Note: Only 11 percent of the foreign born were from English-speaking countries.

Source: Chiswick and Miller (2007).

The impact of taking account of occupation in the earnings function on the payoff to experience is also broadly the same in Australia (Table 2) and the United States (Table 3), to the extent that control for occupation has a much more modest effect on the payoff to experience in each country compared to its respective effect on the

payoff to schooling. However, the effect that is present is more noticeable in the Australian labour market than in the US labour market.

Similar changes are associated with limited English skills in the two labour markets. There is a reduction in the earnings disadvantage associated with limited English skills when occupation is held constant, or equivalently, part of the earnings advantage associated with better English language skills comes about through these skills facilitating the workers' access to higher paying occupations. Once again it appears that the changes in these partial effects of human capital are slightly greater in the Australian labour market than is the case in the US labour market.

Why do the payoffs to schooling, labour market experience and English proficiency change as described above once occupation is included in the estimating equation? The omitted variables formula can be used to shed light on this. Hence consider the relationship between the estimated impact of educational attainment in the benchmark model of earnings that eschews information on occupation, namely $\beta_{education}^{benchmark}$ from column (i) in Table 1, and that in the augmented model that includes information on occupation, namely $\beta_{education}^{augmented}$ from columns (ii) and (iii) in Table 1:⁶

$$E(\beta_{education}^{benchmark}) = \beta_{education}^{augmented} + d_{occup-education} \times \beta_{occupation}^{augmented} \quad (2)$$

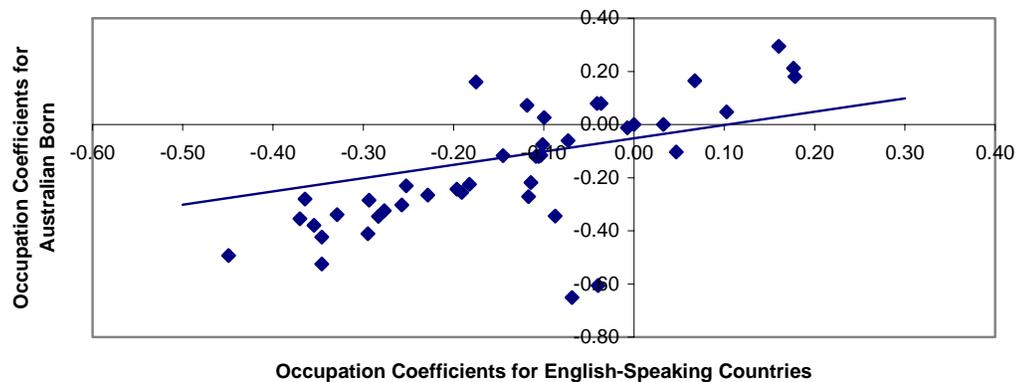
where $d_{occup-education}$ is the coefficient from a regression of the occupation variable on educational attainment and the other regressors in the earnings function, and $\beta_{education}^{augmented}$ is the partial effect of occupation on earnings (*i.e.*, the occupation fixed effects). Hence the changes in the estimated coefficients summarised in Table 2 are due to two sets of factors. First, there is the independent effect that occupation has on earnings, and second, there are the links between variables such as educational attainment and occupation. The differences in the effects that controlling for occupation has on the partial effects of educational attainment, labour market

⁶ Occupation is treated as a continuous variable here for ease of exposition. This is also consistent with the status attainment model considered below.

experience and the English proficiency variables for the Australian born and immigrants must therefore be due to one or both of these factors.

Differences in the impact of occupation on earnings across the three birthplace groups can be assessed informally by plotting the fixed effects from the respective earnings equations. Figure 1 presents the plot of the estimated occupational fixed effects coefficients from the model for the Australian born against the fixed effects coefficients for immigrants from English-speaking countries. Figure 2 presents the plot of the estimated occupational fixed effects coefficients from the model for the Australian born against the fixed effects coefficients for immigrants from non-English-speaking countries. The linear line in this figure is the simple regression of the coefficients for the Australian born on the coefficients for immigrants from English-speaking countries.⁷

Figure 1
Occupational Fixed Effects in Natural Logarithmic Form for the Australian Born and for Immigrants from English-Speaking Countries, 2001

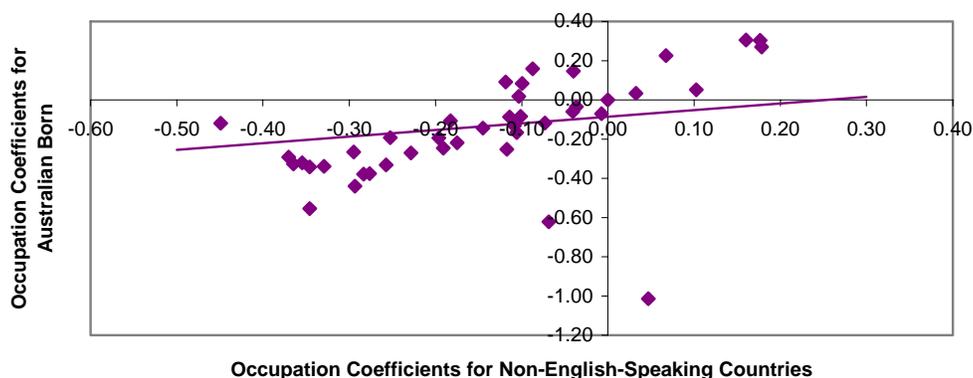


Note: The benchmark occupation in the analysis is Managers and Administrators n.f.d. It has a coefficient of zero for both birthplace groups in the Figure.

Source: Table 1, column (iii) specification.

⁷ The difference in the occupational fixed effects between the Australian born and immigrants from English-speaking countries was related to the proportional representation of immigrants from English-speaking countries in each occupation and to differences in the proportional representation of the Australian born and immigrants from English-speaking countries to ascertain if it was attributable to a crowding phenomenon. The findings did not support this possibility. This is also the case for the occupational fixed effects for immigrants from non-English-speaking countries (Figure 2).

Figure 2
Occupational Fixed Effects in Natural Logarithmic Form for the Australian Born and for Immigrants from Non-English-Speaking Countries, 2001



Note: The benchmark occupation in the analysis is Managers and Administrators n.f.d. It has a coefficient of zero for both birthplace groups in the Figure.

Source: Table 1, column (iii) specification.

It is clear from Figures 1 and 2 that relatively high-paying occupations for one birthplace group are generally also relatively high-paying occupations for the other birthplace groups. There are, however, three occupations (Other Intermediate Production and Transport Workers, Farmers and Farm Managers, and Intermediate Production and Transport Workers n.f.d.) for immigrants from English-speaking countries that do not follow closely the pattern for the Australian born. Similarly, there are three occupations (Labourer and Related Workers n.f.d., Farmer and Farm Managers, and Secretaries and Personal Assistant) for immigrants from non-English-speaking countries where the earnings fixed effects diverge from the respective fixed effects for the Australian born. However, these occupations are of relatively minor importance, accounting for less than five percent of the respective immigrant group's employment.

The correlation coefficient between the occupational fixed effects in Figure 1 is 0.716, while that for Figure 2 is 0.549.⁸ If the data points are weighted by the employment shares of the immigrant groups the correlation coefficients are 0.889 and 0.917. If the occupational employment shares of the Australian born are used then the correlation coefficients are similar, being 0.796 and 0.840, respectively.

⁸ When the atypical occupations identified above are removed from the analysis, these correlation coefficients rise to 0.904 and 0.898, respectively.

These comparisons of the occupational fixed effects suggest that they are so close that they are not likely to be the main contributor to the different pattern of results across birthplace groups in Table 2. Given these findings, the explanation for the differences in the estimates of the earnings equation between the Australian born and the foreign born following augmentation of the model with variables for occupation needs to focus on the partial effects of the explanatory variables on occupational choice. Relevant analyses are presented in Section IV.

IV. OCCUPATIONAL ATTAINMENT

This section presents estimates of a model of occupational attainment that assists in accounting for the pattern of effects reported in Table 2. A model in the tradition of the status attainment models of Nickell (1982) and Evans (1987) is employed. These status attainment models involve first characterising occupations by a measure of status, and using this measure as the dependent variable in a linear regression. Nickell (1982) uses the mean earnings for each occupation. Evans (1987) uses a status attainment score. While status attainment scores are usually viewed as being more encompassing than mean occupational earnings (see Duncan, 1961), although they are based in part on earnings, the use of earnings in the model is consistent with the focus on earnings in Section III.

Hence, the analysis proposed is the estimation of a status attainment model:

$$Occ_i = \alpha X_i + \nu_i \quad (3)$$

where Occ_i is the mean occupational earnings of the Census occupational category (*i.e.*, mean earnings in each of the 44 Census occupations) in which individual i works, X_i is a set of the individual's attributes that influences this occupational outcome, and ν_i is a random error term. As a check on the robustness of the empirical findings, ordered probit models are also estimated using mean occupational earnings as the ranking instrument.

Table 4
Estimates of Model of Occupational Status, with the Mean Occupational Earnings as the Dependent Variable, by Birthplace, Males Aged 20-64, 2001^(a)

Variables	Foreign Born					
	Australian Born		English-Speaking Countries		Non-English-Speaking Countries	
	(i) ^(b)	(ii)	(i) ^(b)	(ii)	(i) ^(b)	(ii)
Constant	2.245 (307.27)	2.054 (210.94)	2.269 (90.91)	2.202 (71.72)	2.412 (100.39)	2.299 (75.76)
Education	0.048 (97.25)	0.062 (94.10)	0.051 (38.67)	0.055 (33.85)	0.041 (35.14)	0.050 (34.49)
Experience	0.001 (3.59)	0.004 (7.58)	0.005 (3.13)	0.005 (2.86)	-0.005 (3.64)	-0.006 (3.81)
Experience Squared/100	0.003 (3.29)	-0.004 (3.39)	-0.006 (1.96)	-0.007 (2.13)	0.011 (4.74)	0.013 (4.58)
Married	0.017 (6.40)	0.022 (5.82)	0.036 (3.97)	0.054 (5.03)	0.010 (1.21)	0.017 (1.62)
Speaks English: ^(d)						
Very Well	(c)	(c)	(c)	(c)	-0.013 (1.67)	-0.015 (1.44)
Well	(c)	(c)	(c)	(c)	-0.084 (9.33)	-0.105 (8.98)
Not Well	(c)	(c)	(c)	(c)	-0.085 (7.55)	-0.123 (8.31)
Not at All	(c)	(c)	(c)	(c)	-0.032 (1.01)	-0.146 (3.71)
Year of Arrival: ^(d)						
1991-1995	(c)	(c)	-0.011 (0.63)	-0.006 (0.32)	-0.016 (1.09)	0.000 (0.01)
1986-1990	(c)	(c)	-0.033 (2.41)	-0.029 (1.71)	-0.005 (0.36)	0.003 (0.19)
Before 1986	(c)	(c)	-0.009 (0.77)	-0.011 (0.83)	0.016 (1.22)	0.035 (2.25)
\bar{R}^2	0.321	0.278	0.281	0.253	0.330	0.321
Sample Size	20,709	20,709	3,127	3,127	3,752	3,752

Notes: (a) Heteroscedasticity-consistent ‘t’ statistics in parentheses; (b) Column (i) specification has the mean occupational earnings at the Major Group level as the dependent variable, column (ii) specification has the mean occupational earnings at the Census occupational classification as the dependent variable; (c) = Variables not entered; (d) = The omitted category for the Speaks English variable is “Speaks only English” and that for the Year of Arrival variable is “After 1995”.

Source: 2001 Australian Census of Population and Housing.

Table 4 contains OLS estimates of the status attainment model for each birthplace group. Two sets of results are provided for each birthplace group: specification (i) is based on mean occupational earnings for the nine major group occupations, while

specification (ii) is for mean occupational earnings for the 44 Census occupational categories.

The estimates in Table 4 for the Australian born show that the main determinant of occupational status, as measured by the t-ratio and magnitude of the partial effect, is educational attainment. Each year of education is associated with entry into occupations having 5 (specification (i)) to 6 (specification (ii)) percent higher earnings. In comparison, the effects on mean occupational earnings associated with potential labour market experience are very slight: in the column (i) results, for the Australian born, mean occupational earnings increase at an increasing rate with labour market experience, whereas in the column (ii) results mean occupational earnings increase at a decreasing rate with labour market experience. In each instance the change in mean occupational earnings between labour market entrants and the most experienced members of the work force is less than the earnings effects associated with two years of education. This finding is consistent with the central feature of the Chiswick and Miller (2007) study, that it was pre-labour market entrance characteristics (primarily educational attainment) and not post-labour market entrance characteristics (particularly labour market experience) that determined occupational status, as measured by mean occupational earnings.

The results for immigrants from English-speaking countries are similar to the findings among the Australian born, having the primary feature of the impact of educational attainment on occupational attainment being far more important than the impact of labour market experience. In other words, while additional education apparently readily opens up access to higher-paying occupations, additional years of labour market experience are not associated with similar access.

Among the foreign born from non-English-speaking countries, years of education are also associated with higher mean occupational earnings, with the partial effect of 0.041 to 0.050 being around one percentage point less than that estimated for the other birthplace groups. This finding is consistent with the smaller partial effects of education on individual earnings among immigrants from non-English-speaking countries in Table 1. However, compared to labour market entrants, immigrants from non-English-speaking countries with moderate amounts of labour market experience

have relatively low mean occupational earnings. This is the same finding as was reported by Chiswick and Miller (2007), on the basis of study of the US labour market. The finding is consistent with the increase in the payoff to labour market experience once occupation is held constant in the study of individual earnings (Tables 1 and 2).

Finally, it is noted that proficiency in English is associated with substantial occupational advancement, though the estimated coefficients in Table 4 are only around one-half the magnitude of the effects established in the study of individual earnings (without the variables for occupation) in Table 1.

Findings similar to these are obtained when an ordered probit model is applied to the occupational data (ranked by mean income).⁹ In particular, the main determinant of membership in a higher-ranked occupation is educational attainment. The effects of labour market experience on occupational outcomes for immigrants from non-English-speaking countries is opposite those estimated for the Australian born and immigrants from English-speaking countries. English proficiency is a major determinant of the likelihood of being employed in a high-income occupation among immigrants from non-English-speaking countries.

Thus, the analyses in Section III suggested that the key to understanding the differences across birthplace groups in the changes to the payoffs to educational attainment and labour market experience as the earnings function is augmented with information on occupation must be differences in the links between occupational attainment and the characteristics of workers. The analyses of the determinants of occupational attainment in this section confirm this. These analyses draw attention to the modest positive impact on occupational attainment of labour market experience for the Australian born and for immigrants from English-speaking countries, and the negative impact on occupational attainment of pre-immigration labour market experience for immigrants from non-English-speaking countries. The main difference between immigrants and the Australian born is that labour market experience will be a “post-Australian labour market entrance” phenomenon for the native born, but pre-

⁹ These results are not presented here, as the information content is broadly the same as Table 4. The results are available from the authors upon request.

immigration labour market experience is a “pre-Australian labour market entrance” phenomenon for the foreign born. Foreign labour market experience may indicate that the skills acquired through formal schooling are less transferable, and hence may be less relevant to the contemporary Australian labour market, particularly if acquired in a non-English-speaking country. Moreover, as argued by Chiswick and Miller (2007), the general skills acquired through formal schooling could become more country-specific, and hence less internationally transferable, with greater levels of experience in the country of origin. Whether the country of origin is English-speaking or non-English-speaking appears to matter in this regard.

These propositions are confirmed by the limited longitudinal evidence available. Chiswick, Lee and Miller’s (2003) analysis of the Longitudinal Survey of Immigrants to Australia¹⁰ shows that immigrants experience a decline in occupational status from the origin to the destination labour market. This decline varies with the skill level at the time of immigration, being greatest for those employed in professional occupations in the country of origin, and less pronounced for other groups. Immigrants from countries with a language and structure of labour markets the same as Australia have minimal change in their occupational status as they enter the Australian labour market. While the samples studied by Chiswick *et al.* (2003) were only of modest size, the empirical regularities in that study and the current research, using different data sets, suggest that analysis of patterns of immigrant occupational attainment may offer considerable insights into immigrant economic adjustment and the associated issue of the international transferability of skills.

V. CONCLUSION

Studies of immigrant economic progress have typically been based on cross-sectional analyses of earnings. Most attention has been focussed on the coefficients of the education and labour market experience terms in the human capital earnings function, modified for the study of immigrants (Chiswick, 1978). The analysis of the effects of labour market experience in this framework has been particularly useful, as the

¹⁰ The Longitudinal Survey of Immigrants to Australia (LSIA) involves three cohorts. LSIA1 covers immigrants who arrived in Australia between August 1993 and August 1995, LSIA2 covers immigrants who arrived in Australia between September 1999 and August 2000, and LSIA3 covers immigrants who arrived in Australia between December 2004 and March 2005. In each instance the immigrants were followed for only short periods, the 3.5 years for LSIA1 being the longest. The Chiswick *et al.* (2003) study was based on LSIA1.

impacts on contemporary labour market earnings of labour market experience in the country of origin and in the destination country can both be assessed. Typically, labour market experience in the country of origin has been associated with quite modest increases in post-migration earnings, and labour market experience in the destination country with much greater increases in earnings. The small labour market rewards to pre-immigration labour market experience appear to be due to the limited international transferability of skills acquired on-the-job in the country of origin.

Chiswick and Miller (2007) document that these patterns are evident in the US labour market in 2000. By augmenting the human capital earnings function with information on occupations, they show that the limited transferability of human capital skills results in immigrants being channelled into relatively low status occupations when they first enter the US labour market. This is the mechanism through which immigrants end up with such small earnings payoffs to pre-immigration labour market experience.

The analyses reported in this paper show that the Chiswick and Miller (2007) findings carry over to the Australian labour market. When occupation is held constant in the earnings equation, there is a reduction of 41 percent in the payoff to schooling for the Australian born, a similar reduction, of 43 percent, in the payoff to schooling for immigrants from English-speaking countries, and an even greater reduction, by 66 percent, in the payoff to schooling for immigrants from non-English-speaking countries. At the same time, holding occupation constant is associated with a quite modest reduction – of less than 10 percent – in the payoff to labour market experience for the Australian born. It is also associated with only a minor reduction—of around 16 percent—in the payoff to pre-immigration experience for immigrants from English-speaking countries. However, the payoff to pre-immigration labour market experience increases by 60 to 70 percent for immigrants from non-English-speaking countries once occupational mobility is controlled for. These remarkable differences are shown in the study of occupational attainment to be linked to a negative association between occupational status and pre-immigration labour market experience for many immigrants from non-English-speaking countries.

The comparison of the findings for the Australian labour market with the study by Chiswick and Miller (2007) for the US labour market revealed that inter-occupational earnings mobility is of greater importance in gaining a payoff to education in Australia than in the US. This is likely to be linked to the more egalitarian distribution of earnings that is associated with the more centralised system of wage determination, and perhaps great union power, in Australia than in the US.

These findings suggest that attention needs to be focussed on occupational outcomes at the time of labour market entry in the destination country. The different immigrant selection regimes of the US (emphasis on family reunion) and Australia (emphasis on skill-based immigration and selection via a points test) do not appear to matter in this regard. More fundamental labour market processes seem to be at work. The study of occupational attainment for sub-groups of the population who may face different transitions (*e.g.*, have access to well established networks or settle in areas with tight labour markets) may assist in understanding these processes.

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APPENDIX A
Table A1
Census Occupation Classification

Census Code	Label ¹¹
1	Managers and Administrators n.f.d.
2	Generalist Managers
3	Specialist Managers
4	Farmers and Farm Managers
5	Professionals n.f.d.
6	Science, Building and Engineering Professionals
7	Business and Information Professionals
8	Health Professionals
9	Education Professionals
10	Social, Arts and Miscellaneous Professionals
11	Associate Professionals n.f.d.
12	Science, Engineering and Related Associate Professionals
13	Business and Administrative Associate Professionals
14	Managing Supervisors (Sales and Service)
15	Health and Welfare Associate Professionals
16	Other Associate Professionals
17	Tradespersons and Related Workers n.f.d.
18	Mechanical and Fabrication Engineering Tradespersons
19	Automotive Tradespersons
20	Electrical and Electronics Tradespersons
21	Construction Tradespersons
22	Food Tradespersons
23	Skilled Agricultural and Horticultural Workers
24	Other Tradespersons and Related Workers
25	Advanced Clerical and Services Workers n.f.d.
26	Secretaries and Personal Assistants
27	Other Advanced Clerical and Services Workers
28	Intermediate Clerical, Sales and Services Workers n.f.d.
29	Intermediate Clerical Workers
30	Intermediate Sales and Related Workers
31	Intermediate Services Workers
32	Intermediate Production and Transport Workers n.f.d.
33	Intermediate Plant Operators
34	Intermediate Machine Operators
35	Road and Rail Transport Drivers
36	Other Intermediate Production and Transport Workers
37	Elementary Clerical, Sales and Services Workers n.f.d.
38	Elementary Clerks
39	Elementary Sales Workers
40	Elementary Services Workers
41	Labourers and Related Workers n.f.d.
42	Cleaners

¹¹ n.f.d. = Not further defined.

43	Factory Labourers
44	Other Labourers and Related Workers n.f.d.

The Major Group Occupations are aggregates of these codes:

Managers and Administrators	(codes 1-4)
Professionals	(codes 5-10)
Associate Professionals	(codes 11-16)
Tradespersons	(codes 17-24)
Advanced Clerical	(codes 25-27)
Intermediate Clerical	(codes 28-31)
Production Workers	(codes 32-36)
Elementary Clerical	(codes 37-40)
Labourers	(codes 41-44)

APPENDIX B DEFINITIONS OF VARIABLES

The variables used in the statistical analysis of the 2001 Australian Census of Population and Housing are defined below. The analyses are restricted to male full-time workers (*i.e.*, working 35 hours or more per week) aged 20-64 years.

Dependent Variables	
<i>Log of Hourly Earnings</i>	Natural logarithm of hourly earnings (where earnings are defined as gross earnings from all sources). As weekly earnings was coded in intervals, midpoints of intervals were used to construct a continuous measure. The open-ended upper category was assigned a value of 1.5 times the lower threshold level. Weekly hours were recorded in intervals so midpoints were used to construct a continuous measure. Hourly earnings was then constructed by dividing weekly earnings by weekly hours worked.
Explanatory Variables	
<i>Years of Education</i>	This is a continuous variable that records the equivalent years of full-time education completed by the individual. Individuals holding a Postgraduate degree are assigned 19 years of education, Graduate Diploma and Graduate Certificate holders are assumed to have 17 years, Bachelor degree holders have the equivalent of 15.5 years of education, advanced Diploma and Diploma holders are coded as having 14 years, holders of Certificate are assigned 13 years, those who have completed either Year 9 or any years through to Year 12 are coded as 9, 10, 11 and 12 years of education, respectively, and those who did not go to school or attained Year 8 or below are assumed to have 7 years of education.
<i>Experience</i>	The experience variable was derived using the Mincer (1974) Proxy; Age – Years of Education – 5.
<i>Marital Status</i>	Binary variable set to one if an individual is married and set to zero otherwise.
<i>English Proficiency</i>	Five English skills categories are distinguished: (i) speaks only English at home; speaks a language other than English at home and speaks English (ii) very well; (iii) well; (iv) not well; (v) not at all. Dichotomous variables are included in the estimating equation for the latter four variables, with the “speaks only English at home” group being the benchmark group.
<i>Government Employment</i>	This is binary variable that distinguish between those working in government organisations and those working in the private sector.
<i>Birthplace of individual</i>	Individuals who were born overseas (<i>OSENG</i> for overseas born from English-speaking countries; <i>OSNENG</i> for overseas born from non-English-speaking countries) are distinguished

*Duration of Residence
in Australia*

from the Australian born.

This records the number of years an individual born overseas has lived in Australia. Three dummy variables were created based on the Census information: Arrived 1991-1995, Arrived 1986-1990, Arrived before 1986. The benchmark group is those who arrived after 1995.

Table B1
Descriptive Statistics of Variables by Birthplace Groups

Variable	Mean	Standard Deviation
<u>Australian Born:</u>		
Log Hourly Income	2.882	0.562
Years of Education	12.072	2.396
Years of Experience	21.761	11.505
Marital Status	0.708	0.455
Government Sector	0.164	0.371
Managers and Administrators	0.144	0.351
Professionals	0.174	0.379
Associate Professionals	0.134	0.341
Tradespersons	0.213	0.409
Advanced Clerical	0.008	0.087
Intermediate Clerical	0.092	0.289
Production Workers	0.125	0.331
Elementary Clerical	0.039	0.194
Labourers	0.071	0.256
 <u>English-Speaking Countries:</u>		
Log Hourly Income	3.004	0.542
Years of Education	12.594	2.495
Years of Experience (EXPER)	25.430	10.753
Years of Arrival:		
<i>Arrived 2000-2001</i>	0.046	0.210
<i>Arrived 1998-1999</i>	0.056	0.230
<i>Arrived 1996-1997</i>	0.043	0.203
<i>Arrived 1991-1995</i>	0.068	0.253
<i>Arrived 1986-1990</i>	0.125	0.331
<i>Arrived Before 1986</i>	0.661	0.473
Marital Status	0.790	0.407
Government Sector	0.151	0.358
Managers and Administrators	0.154	0.361
Professionals	0.216	0.412
Associate Professionals	0.130	0.336
Tradespersons	0.204	0.403
Advanced Clerical	0.007	0.082
Intermediate Clerical	0.090	0.286
Production Workers	0.105	0.307
Elementary Clerical	0.037	0.188
Labourers	0.058	0.233
 <u>Non-English-Speaking Countries:</u>		
Log Hourly Income	2.883	0.562
Years of Education	12.673	3.067
Years of Experience (EXPER)	25.067	11.467
English Proficiency:		
<i>Very Well</i>	0.408	0.491

<i>Well</i>	0.231	0.421
<i>Not Well</i>	0.072	0.258
<i>Not at All</i>	0.004	0.061
Years of Arrival:		
<i>Arrived 2000-2001</i>	0.028	0.165
<i>Arrived 1998-1999</i>	0.039	0.193
<i>Arrived 1996-1997</i>	0.037	0.190
<i>Arrived 1991-1995</i>	0.107	0.310
<i>Arrived 1986-1990</i>	0.183	0.387
<i>Arrived Before 1986</i>	0.606	0.489
Marital Status	0.780	0.414
Government Sector	0.124	0.330
Managers and Administrators	0.112	0.315
Professionals	0.218	0.413
Associate Professionals	0.129	0.336
Tradespersons	0.180	0.384
Advanced Clerical	0.007	0.083
Intermediate Clerical	0.067	0.250
Production Workers	0.148	0.355
Elementary Clerical	0.035	0.185
Labourers	0.104	0.305
