June 2005

THE IMMIGRANT HOUSING MARKET: ANALYSES FOR AUSTRALIA*

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ABSTRACT

This paper examines the immigrant adjustment process in Australia from the perspective of the housing market. It shows that immigrant "catch-up" to the native born in the housing market is much more rapid than in the labour market. A decomposition of the estimated coefficients of a logit model of tenure choice is developed that gives formal recognition to the immigrant adjustment process. The results from this decomposition demonstrate the importance of taking account of immigrant adjustment when seeking to understand variations in rates of home ownership across birthplace groups.

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I. INTRODUCTION

The immigrant adjustment process has been the focus for a large number of studies of labour market outcomes in Australia (see Miller and Neo (2003)). Other studies have widened the scope of enquiry into immigrant adjustment by considering participation in political and social matters (Kelley and McAllister (1984)), proficiency in English (Chiswick and Miller (1995)) and immigrants' investments in the housing market (Kee (1992), Bourassa (1993)(1995)). The latter line of research compares the home ownership rates of immigrants and the native born, and examines how the native born advantage in this regard varies by the length of residence of immigrants in Australia. Convergence of the rate of home ownership of the foreign born to that of the native born has been proposed as an index of economic and social adjustment (Chiswick and Miller (2003)).

In recent years there has been concern over the impact of rising housing prices on the ability of the young to enter the housing market (Mudd, Tesfaghioris and Bray (2001)). As recently arrived immigrants share many of the experiences of young adults—they are entrants into the Australian labour market and generally have little wealth—it is likely that these housing pressures on the young will carry across to the immigrant experience, and impact on the immigrant adjustment process. This matter has been unexplored to date, and is the focus of the current study. Hence the paper uses 2001 Census data to examine home ownership patterns among immigrants, and compares these with the home ownership patterns among the native born. Chiswick's (1978)(1979) theory of immigrant adjustment is the underlying model applied to explore the factors that affect the home ownership decision and the immigrant adjustment process in Australia.

Data analysis is carried out on the three groups distinguished in much of the recent literature on the labour market outcomes of immigrants, namely the Australian born, those born abroad in English-speaking countries and those born abroad in non-English-speaking countries. Analyses are also conducted for a number of separate birthplace groups (Germany, Italy, Greece, Philippines, Vietnam, China). Three main issues are addressed. The first is whether home ownership rates differ across birthplace groups. The second issue concerns the

determinants of immigrants' home tenure choice: are these the same as for the native born? The third issue explored is whether findings for Australia are consistent with those reported for the United States.

The paper is organised as follows. Section II reviews literature that is pertinent to the immigrant adjustment process, presents Chiswick's (1978)(1979) theory of immigrant adjustment, and shows how this can be applied to the housing market. The third and fourth sections present the data and methodologies used, and discuss results from a logit model of the determinants of house ownership. The fifth section develops a method for categorising the differences between birthplace groups as being due to the different endowments of the groups and due to behavioural or other differences between the groups. The final section summarises the major empirical findings and implications of the results.

II. LITERATURE REVIEW

The immigrant adjustment literature seeks to assess whether new immigrants are able to assimilate themselves in the destination country. It has utilised proxies such as earnings, the employment rate and language skills to capture immigrant adjustment effects. The studies have found that immediately after arrival immigrants experience lower income and higher unemployment rates than the Australian born, though this disadvantage is smaller for those from English-speaking countries. As the length of residence increases, the immigrant experience becomes similar to that of the Australian born (Chapman and Miller (1986)).

The use of home tenure choice adds an additional dimension to the previous studies, and allows for a more comprehensive understanding of the immigrant experience. The studies that have explored issues associated with the home tenure choices of immigrants in Australia have examined the relative importance of various economic and demographic variables, including household income, occupation, age, marital status, language proficiency, household size and the number of dependent children (Kee (1992), Bourassa (1993)(1995) and Junankar *et al*. (1993)). The typical model utilised has the following form:

Probability of owning a home = f(Birthplace, Length of Residence, Educational Attainment, Family Income, Marital Status, English Proficiency, Occupation, Age, Family Status).

(1)

Junankar *et al*. (1993) report that housing tenure choice is related to immigrant's country of birth, with immigrants from New Zealand having a higher likelihood of renting, presumably owing to high rates of return migration for this group. Similarly, Kee (1992) reports that immigrants from Italy, Malta, Greece and Yugoslavia have above average rates of home ownership. Bourassa (1995), however, found that after controlling for differences such as duration of residence in Australia and marital status, seven out of the ten immigrant groups[1] studied in Sydney and Melbourne had similar home tenure choices as the Australian born. The other three immigrant groups (from Italy, Lebanon and Malta) actually had higher home ownership rates than the Australian born. This could be due to behavioural differences of the three immigrant groups, or other factors that affected the home ownership decision that were not captured in the model specifications. Despite this apparent anomaly, Bourassa (1995) concluded that, in general, immigrants' home purchasing behaviour is not too dissimilar to that of the Australian born.

The length of time immigrants have lived in Australia has been shown in a number of studies to have an important bearing on their housing tenure choice. Junanker *et al.* (1993) argue that immigrants appear to go through a tenure cycle, which begins with renting or shared accommodation, and then owning their own home. The probability of home ownership for immigrants is relatively low in the immediate post-arrival period as, being new to the housing market, they may not possess the collateral needed to secure a housing loan.[2] There may also be instances of discrimination. Junankar *et al*. (1993) cite evidence of immigrants being particularly subject to such exploitation because of language barriers and lack of knowledge about industry practices.

With time in Australia, however, immigrants acquire the resources necessary to switch from renting to owning. They will also accumulate the knowledge that will enable them to make

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[1]The immigrant groups were the UK, New Zealand, Italy, Yugoslavia, Greece, Vietnam, Germany, Lebanon, Poland and Malta (Bourassa 1995, p.132).

[2] Junankar *et al*. (1993) reported that a very high percentage of immigrants (around 67 percent) rent during their early years of settlement.

better-informed decisions. Consequently, rates of home ownership among longer-term residents even often surpass those of the Australian born. At the same time, it would be expected that rates of home ownership will vary across immigrant groups owing to different levels of resources and different expectations. For example, some foreign born may feel that buying a house is not a viable long term investment.[3]

The patterns of change in immigrants' housing tenure choice with duration of residence in Australia appear to be similar to those reported for the US by Coulson (1999) and Chiswick and Miller (2003). Coulson (1999, p.214) remarks that as the immigrant status dissipates over a period of time, the probability of home ownership in the US increases. Similarly, using home ownership as an indicator of immigration adjustment, Chiswick and Miller (2003) found that it took just several decades of living in the United States before immigrants have the same rates of home ownership as the native born.

These observations have similarities with the patterns of immigrant adjustment reported in the labour economics literature concerning earnings, employment and the language skills of immigrants. As such, it is likely that the focal model of immigrant adjustment proposed by Chiswick (1978), that has been used to good effect in the labour economics literature, may be able to guide the study of the immigrant housing market, and a brief outline is provided below.

Chiswick (1978)(1979) proposed a simple but powerful model to explain the economic progress of immigrants relative to the native born. Specifically, he distinguished between "economic" and "non-economic" immigrants. All immigrants are assumed to make decisions based on maximisation of their economic well-being. The strict distinction between the two is that economic immigrants are motivated by monetary returns, rather than by social and political factors. He further categorised them into three sub-groups; economic immigrants from English-speaking countries, economic immigrants from other countries, and refugees.

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[3] Whether a person should own or rent depends on a range of circumstances, including the length of time they expect to live in the particular location, the rate at which they can borrow money, and the amount of equity they have. Owning is not the optimal decision for everyone. The issues involved in the "own versus rent" decision are outlined in Anstie, Findlay and Harper (1983).

Consistent patterns of earnings are expected across the three sub-groups, as illustrated in Figure 1.

Figure 1
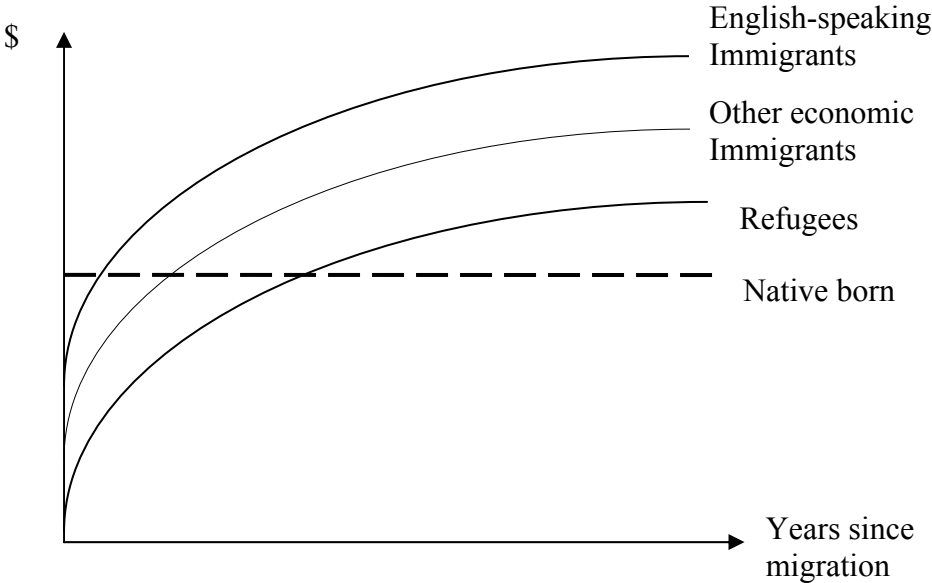**Model of Earnings for Immigrants and the Australian born**

Figure 1 captures the general patterns of earnings determination that have been reported in Australia and for many other countries. In particular, immigrants earn less than the native born in the first year of residence in Australia, though the extent of this disadvantage varies across immigrant groups, being greatest for refugees and least for economic immigrants from English-speaking countries. This disadvantage is argued to reflect the less-than-perfect international transferability of the skills immigrants acquired in their country of origin.

The post-arrival improvement in the earnings of immigrants reflects their investments in skills relevant to the Australian labour market. These investments may not only be valuable in their own right, but they could also increase the international transferability of immigrants' stock of pre-immigration human capital. For example, learning English in the post-arrival period may enhance the value of both the immigrants' pre-arrival formal schooling and the skills they acquire through labour market experience.

The initial earnings disadvantage experienced by the immigrants is expected to vanish and their earnings may even exceed those of the native born as their duration of residence increases. This effect could be associated with the self-selection process in migration. Hence, Chiswick (1979) argued that immigrants often have a higher level of innate ability and work motivation than their fellow countrymen with similar characteristics who remain at home. In the United States, it was found that, other things being equal, foreign born white men had earnings comparable to those of the native born within 13 years of immigration (Chiswick (1978)).

Chiswick's model of the economic progress of immigrants appears to be well suited to account for the typical observations of immigrant outcomes in the housing market. It suggests that attention should be placed on the way rates of home ownership vary across groups of immigrants that differ in the international transferability of their pre-immigration experiences. Attention should also be placed on how rates of home ownership change with duration of residence. The analyses of immigrant housing tenure choices in Australia that follow focus on these issues.

III. DATA

The data used below are from the 2001 Census of Population and Housing (see Australian Bureau of Statistics (2003)). The Census data file released by the Australian Bureau of Statistics (ABS) contains information on an individual's personal, family and dwelling circumstances for a one percent sample of households in Australia. All samples analysed below are restricted to male heads of household between the ages of 20 and 64. After the omission of individuals with missing data on key variables, a total of 34,968 observations on households was obtained.

There are two features of the Census of Population and Housing data that should be noted. Firstly, it was reported in a paper commissioned by the Australian Housing and Urban Research Institute that, due to the imprecise wording of the housing tenure question, it is difficult to determine whether the owner of the house is a usual resident of the household (MacDonald 2003, p.3). In addition, it is currently common for people to rent while actually

owning other housing properties. These limitations may lead to measurement errors in the data obtained. Provided these measurement errors are random, however, they will not have any major impact on the analyses undertaken.

Secondly, despite the model including a host of predictors of home ownership, data limitations have led to the exclusion of certain factors, such as credit history, non-financial assets, relative costs of housing etc, which could be key determinants of the home ownership decision. In other words, the model could suffer from omitted variable bias. There is, however, no way of determining the extent or direction of this possible bias.

In terms of model specifications, there are two main issues that need to be addressed. The first specification issue concerns the definition of the dependent variable. The dependent home ownership variable, Y, is coded 0 or 1. Where Y=1 the household is a home owner, and Y=0 represents otherwise.

Due to the binary nature of the dependent variable a logit model is used to quantify the effects of the various determinants of home ownership, and is expressed as follows:

$$prob(Y = 1) = \frac{1}{1 + e^{-\beta X}} = \hat{Y} \qquad\qquad (3)$$

where X is a vector of covariates and β is a vector of parameters to be estimated. This equation follows a logistic distribution function.

Table 1 lists the calculated rate of home ownership for the aggregate sample and the separate birthplace groups of the Australian-born, immigrants from English-speaking countries (ENGC) and immigrants from non-English-speaking countries (NENGC). A large proportion (approximately 70 percent) of the overall population owns their own home, and only 30 percent rent. The slightly lower percentage of ENGC immigrants owning homes compared to NENGC immigrants is a surprising result, and will be investigated in detail below.

Table 1
Means of Variables by Birthplace

	Total Sample	Australian-born	ENGC	NENGC
Probability of owning a home	0.70	0.71	0.68	0.70
ENGC (proportion)	0.11	0.00	1.00	0.00
NENGC (proportion)	0.17	0.00	0.00	1.00
YEAR (years)	4.44	0.00	16.20	15.62
AGE (years)	42.22	41.27	45.10	44.42
ENGP (proportion)	0.98	1.00	1.00	0.88
EDUC (years)	11.77	11.59	11.94	11.94
INCOME ($/100)	11.86	11.87	12.43	11.44
MS (proportion)	0.76	0.75	0.75	0.80
KIDS (proportion)	0.43	0.43	0.37	0.49
FAMILY (proportion)	0.80	0.79	0.79	0.83
Sample Size	34,968	25,170	3828	5970

Source: 2001 Census of Population and Housing Unit Record File.

The second specification issue relates to the explanatory variables included in the analysis to account for the variation in the probability of owning a home discussed above. The choice of explanatory variables is constrained by the set of variables released in the unit record files by the ABS, and within this constraint the choice is guided by the literature, as outlined in equation (1).

The explanatory variables can be broadly classified into two categories: individual characteristics and family characteristics. There are five types of explanatory variables that fall within the individual-specific categorisation: (i) foreign born birthplace, comprising the variables for born in English-speaking countries and born in non-English-speaking countries, (ii) years since arrival in Australia among the foreign born (YEAR), (iii) age of the individual (AGE), (iv) English proficiency (ENGP), and (v) educational attainment (EDUC).

In the case of birthplace effects, two covariates are constructed: ENGC equals one if the household head was born in an English-speaking country and NENGC equals one if the household head was born in a non-English-speaking country. The reference group is those born in Australia. This grouping parallels that used in the immigrant labour market adjustment literature, and hence will facilitate comparisons across the labour market and housing dimensions of the adjustment process. According to Table 1, 10.95 percent of the sample were born abroad in English-speaking countries and 17.07 percent were born abroad in non-English-speaking countries.

The YEAR variable, which records the number of years a foreign born person has lived in Australia, is included in the model to enable quantification of the immigrant adjustment process in the housing market. As most of the Australian literature has shown that immigrant adjustment occurs very slowly, and at a reasonably uniform rate, only a linear functional form is considered. The YEAR variable equals zero for non-immigrants.

The AGE of the household head is included in the estimating equation in quadratic form. This choice is dictated by the home ownership-age relationship reported in past studies. Such a relationship is expected to emerge for two reasons: (i) wealth effects, and (ii) life cycle effects. Previous studies (see Bourassa (1995) for discussion) have argued that wealth is an important determinant of the home ownership decision, with a lack of current wealth increasing the probability of the household renting rather than owning. However, information on an individual's current wealth is not available in the data set, and thus age is used as a proxy for wealth. The assumption here is that a person's wealth increases as they get older, *ceteris paribus*.

The use of age to capture life cycle effects has been proposed by Wachter and Megbolugbe (1992). This perspective suggests that it is when individuals are in their late teens and early twenties that they leave the parental home and start renting. Following a period when savings are accumulated, buying a home becomes the preferred alternative, and this usually happens by their mid-twenties and thirties. Age may be important in the comparison of the home

ownership decisions of the Australian born and foreign born as the foreign born are, on average, four to five years older than the native born.

The degree of English proficiency is a key indicator of immigrant adjustment in Australia, and the role of this variable in the home ownership decision is captured by the dummy variable ENGP. This variable is constructed so that a classification of one corresponds to a household head being proficient in English, with the reference group comprising those with limited English skills. It is expected that individuals with a good command of English are more adaptable and will be better able to adjust to circumstances in Australia. Just as this adjustment has been reflected in favourable labour market outcomes (see Miller and Neo (2003)), it could also be associated with a higher probability of owning a home. English proficiency is essentially universal among those born in Australia or born abroad in an English-speaking country. However, 12 percent of the NENGC sample is not proficient in English.

The level of education is a good proxy for future economic success or permanent income, so it should have a positive relationship with the probability of owning a home. Following Chiswick and Miller (2003), it is argued that education is a better indicator for permanent incomes than for current income, which is subject to transitory influences. According to the data in Table 1, the foreign born have, on average, a higher educational attainment than the Australian born, and this advantage will presumably go some way towards accounting for immigrants' relatively good standing in the housing market. The self selection in migration and the focus of Australia's migration policy on selecting skilled immigrants are factors that should result in a higher educational attainment for immigrants than for the native born.

There are four explanatory variables that fall within the family-specific categorisation: (i) household income (INCOME), (ii) marital status (MS), (iii) presence of dependent children (KIDS), and (iv) whether the individual lives in a family environment (FAMILY).

The INCOME variable is the total household weekly income. For a single-person household this will be given by individual income. A quadratic function is used for INCOME to allow

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the partial effect on the probability of home ownership to vary across income classes. According to Table 1, those who were born in English-speaking countries have the highest mean weekly income (of $1243) while the lowest mean weekly income (of $1144) is found among those who were born in non-English-speaking countries. The Australian born have a mean weekly income of $1187.

Marriage and having children are shown in the literature to be key influences on the home buying decision. A broad indicator of marital status (MS=1 for married and 0 for single) is used. The children variable is a simple indicator of whether at least one dependent or independent child was present in the household. Those born in non-English-speaking countries have the greatest incidence of households with children (0.49), whereas the Australian born and those born in English-speaking countries have incidences of households with children of 0.43 and 0.37, respectively.

The variable FAMILY is included to control for differences in the characteristics of the heads of households. It is expected that there will be a greater likelihood of owning a house when an individual lives in a family structure. Those born in non-English-speaking countries have the greatest proportion living in a family structure (0.83) compared to those born in English-speaking countries (0.79) and the Australian born (0.79).

Given this detail on both the dependent and independent variables, the model for understanding the determinants of the probability for home ownership can be expressed as:

$$prob(Y = 1) = \frac{1}{1 + e^{-\beta X}}$$

where $\beta X = \beta_0 + \beta_1 ENGC + \beta_2 NENGC + \beta_3 YEAR + \beta_4 AGE + \beta_5 AGESQ + \beta_6 ENGP + \beta_7 EDUC + \beta_8 INCOME + \beta_9 INCOMESQ + \beta_{10} MS + \beta_{11} KIDS + \beta_{12} FAMILY.$ (4)

A summary of the definitions of the explanatory variables is provided in Table 2.

Table 2
Description Explanatory Variables

Variable	Description
ENGC	This is a dichotomous variable and set equal to unity if the head of household was born overseas in an English-speaking country.
NENGC	This is a dichotomous variable and set to equal to unity if the head of household was born overseas in a non-English-speaking country.
YEAR	This is a continuous variable and measures the number of years the foreign born head of household has resided in Australia. YEAR equals zero for Australian-born heads of household.
AGE	This is a continuous variable and measures the head of household's age.
ENGP	This is a dichotomous variable and is set equal to unity if the head of household is proficient in English.
EDUC	This is a continuous variable and measures the head of household's educational attainment in years.
INCOME	This is a continuous variable and is computed from the weekly family income. For single individuals, personal weekly income is used. For INCOME, the mid point of each band of the categorical variable in the original data set (and a value of 1.5 times the lower level of the open-ended upper income category) was used to construct a continuous measure of income. The resultant INCOME was divided by 100 for expositional purposes.
MS	This is a dichotomous variable and is set equal to unity if the head of household is married. Note that individuals in a de facto relationship have been classified as married.
KIDS	This is a dichotomous variable set equal to one where dependent or independent children are present in the household.
FAMILY	This is a dichotomous variable and is set equal to unity if the head of household lives under a family environment, as distinct from living alone or in a group household.

The logit estimations were conducted separately for the aggregate population, the Australian born, and the ENGC and NENGC birthplace groups. This will allow the effect of each variable to vary across these birthplace groups. This is important in the context of the information presented in Table 1. In particular, heads of households born in non-English-speaking countries seem to have a higher chance of owning a home even though they have incomes lower than the other birthplace groups.

IV. EMPIRICAL RESULTS

Table 3 lists results from the estimation of equation (4). This model fits the data quite well, with the likelihood ratio (LR) test that all or some of the regressors have a significant impact on the probability of home ownership being highly significant. The McFadden R^2 is approximately 0.19. This is a very high value for cross-sectional models of this nature, though the literature has not reached agreement on what constitutes a "good" or "high" McFadden R^2. The t-ratios in column (i) of Table 3 reveal that all the independent variables in the equation

for the total sample are significant at the 1 percent level except English proficiency. However, English proficiency is significant at the 7 percent level.[4]

Table 3
Logit Model Estimates of Probability of Home Ownership

Variables	Total Sample (i)	Australian Born (ii)	ENGC (iii)	NENGC (iv)
Constant	-4.551	-6.301	-6.628	-3.976
	(19.99)	(11.67)	(9.12)	(6.95)
ENGC	-2.023	(a)	(a)	(a)
	(22.92)			
NENGC	-1.864	(a)	(a)	(a)
	(21.90)			
YEAR	0.099	(a)	0.103	0.097
	(20.80)		(12.42)	(15.81)
AGE	0.104	0.108	0.101	0.055*
	(10.62)	(9.49)	(3.13)	(2.08)
AGESQ	-0.001	-0.001	-0.001	-0.000
	(4.21)	(3.63)	(1.43)	(0.22)
ENGP	0.178	1.493	(b)	0.273*
	(1.80)	(3.09)		(2.54)
EDUC	0.014	0.036	0.039	-0.070*
	(2.36)	(4.92)	(2.26)	(5.37)
INCOME/100	0.138	0.152	0.139	0.073*
	(15.02)	(13.91)	(5.01)	(3.32)
INCOMESQ/10000	-0.003	-0.003	-0.003	-0.001*
	(9.41)	(9.21)	(3.42)	(0.96)
MS	0.668	0.650	0.751	0.659
	(10.32)	(8.62)	(3.87)	(3.83)
KIDS	0.361	0.420	0.388	0.142*
	(10.55)	(10.41)	(3.80)	(1.67)
FAMILY	0.266	0.207	0.336	0.594**
	(3.90)	(2.63)	(1.63)	(3.21)
Sample Size	34,968	25,170	3,828	5,970
McFadden R^2	0.192	0.184	0.201	0.232

Notes: 't' statistics in parentheses.
(a) = Variable not relevant
(b) = Variable omitted from regression. As there are only 2 individuals in the ENGC sample who are not proficient in English, and neither own their own home, the ENGP variable needs to be omitted.
** indicates coefficient significantly different from that for the Australian born at the 10 percent level; * indicates coefficient significantly different from that for the Australian born at the 5 percent level.

Source: 2001 Census of Population and Housing Unit Record File.

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[4] In the equation estimated separately for NENGC immigrants, where English speaking proficiency may be a more meaningful variable, the ENGP variable is highly significant. It is noted that twenty-three respondents born in Australia do not speak English at all, and eight of them own their own home.

As the logit coefficients are difficult to interpret (see equation (3)), partial effects are calculated, and these are listed in Table 4. They have been computed using the formula $\frac{\partial \widehat{Y}}{\partial x_k} = \beta_k (\overline{Y})(1 - \overline{Y})$ for continuous variables, and as differences in predictions for groups distinguished within the dichotomous variables.[5] The partial effect for the quadratic in age is evaluated at 40 years and the partial effect of the quadratic in income is evaluated at $1000.

Table 4
Partial Effects of Variables on the Probability of Home Ownership, Computed from Logit Model Estimates

Variables	Total Sample (i)	Australian-Born (ii)	ENGC (iii)	NENGC (iv)
ENGC	-0.461	-	-	-
NENGC	-0.419	-	-	-
YEAR	0.019	-	0.021	0.019
AGE	0.013	0.014	0.013	0.011
ENGP	0.036	0.348	-	0.056
EDUC	0.003	0.007	0.008	-0.014
INCOME*100	0.016	0.016	0.015	0.012
MS	0.138	0.132	0.163	0.140
KIDS	0.068	0.078	0.077	0.028
FAMILY	0.053	0.040	0.071	0.127

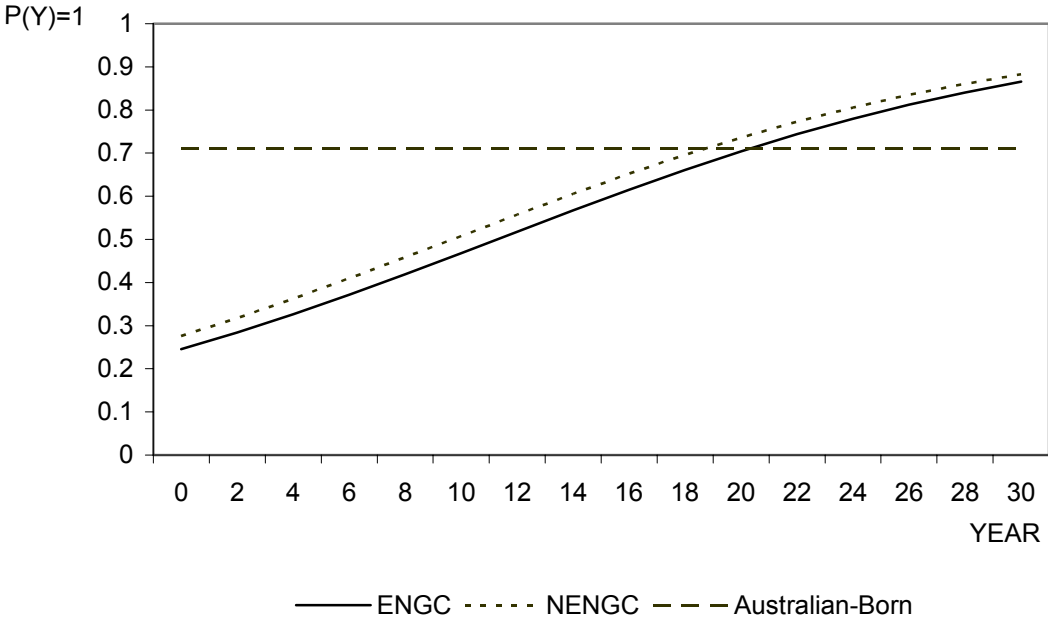Source: Authors' calculations based on the estimates in Table 3.

The negative coefficients of ENGC and NENGC reveal that individuals born overseas, regardless of whether this was in an English-speaking or non-English- speaking country, have a lower chance of owning a home than the Australian-born benchmark group. It is estimated in Table 4 that being born overseas reduces the probability of owning a home by more than 40 percentage points. As this analysis holds constant the length of time the immigrants have resided in Australia, these birthplace effects record the effects for recent arrivals. Against this perspective, the quite sizable effects are understandable. The similarity of the estimated effects

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[5] For example, the partial effect for marital status (MS) is the difference between the predicted rate of home ownership for those who are married and that for those who are not married.

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for the two broad categories of the foreign born is, however, surprising. One possible explanation is that immigrant groups from non-English-speaking countries, such as Italy, Greece and Malta, have established foundations and networks in Australia, and these networks offer advantages to recent arrivals in the housing market.

The longer the foreign born have resided in Australia, the higher the probability of owning a home, with this probability rising by approximately 2 percentage points per year of residence in Australia. This impact should be examined collectively with the birthplace indicators, ENGC and NENGC, as illustrated in Figure 2. This figure shows that the predicted rate of home ownership among the foreign born is the same as that for the native born after about twenty years of residence in Australia. This provides an estimate of immigrant "catch up" in the context of the housing market.[6]

Figure 2
Probability of Home Ownership against YEAR
**for Aggregate Overseas-Born**

Source: Authors' calculations based on the results reported in Table 3

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[6] The column (i) specification constrains the adjustment effects associated with period of residence to be the same for ENGC and NENGC immigrants: this constraint is consistent with the data.

As shown by the results in Table 3, the probability of buying a house increases at a decreasing rate with age. This relationship is depicted in Figure 3. Individuals who fall into the age bracket of twenty to thirty-five years of age have approximately a two percentage point higher chance of owning a home with each passing year. In comparison, individuals who are about 50 years of age have approximately a one percentage point higher chance of owning a home with each passing year.

Figure 3
**Probability of Home Ownership against AGE**
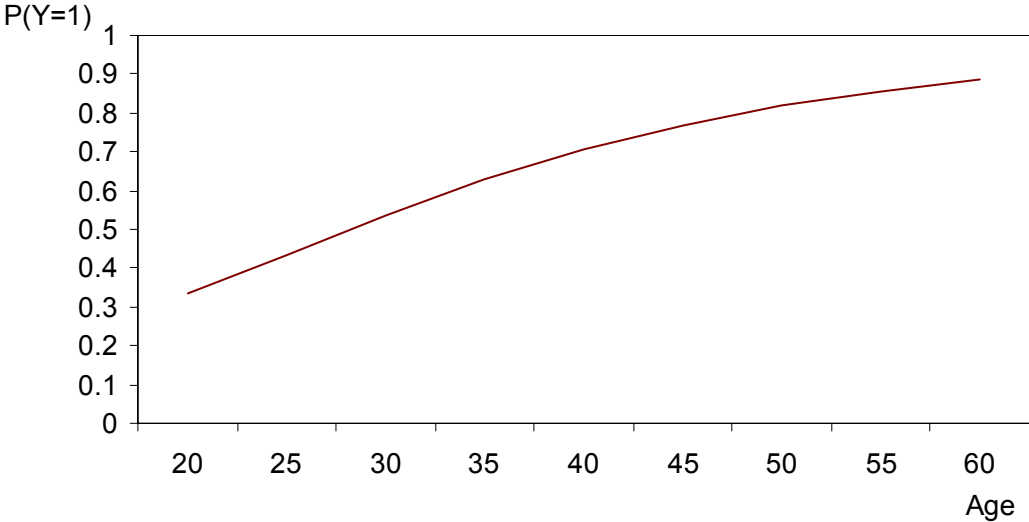
Source: Authors' calculations based on the results reported in Table 3

The coefficient on the ENGP variable is positive, which suggests that the probability of owning a home is greater among those who are proficient in English. The partial effect, at 0.036 (see Table 4), is, however, quite modest. The role of English proficiency in the housing market appears to be far less than the role that this characteristic has in the labour market (see Chiswick and Miller (1995)).

The last individual characteristic variable to consider is EDUC. As expected, EDUC has a positive relationship with the probability of home ownership.

The logit model results for income, as shown in Table 3, display a nonlinear relationship with home ownership, with the likelihood of owning a home increasing at a decreasing rate with income over the income levels represented in the data set. Predicted probabilities of home ownership by income are presented in Figure 5.

Figure 5
Probability of Home Ownership against INCOME
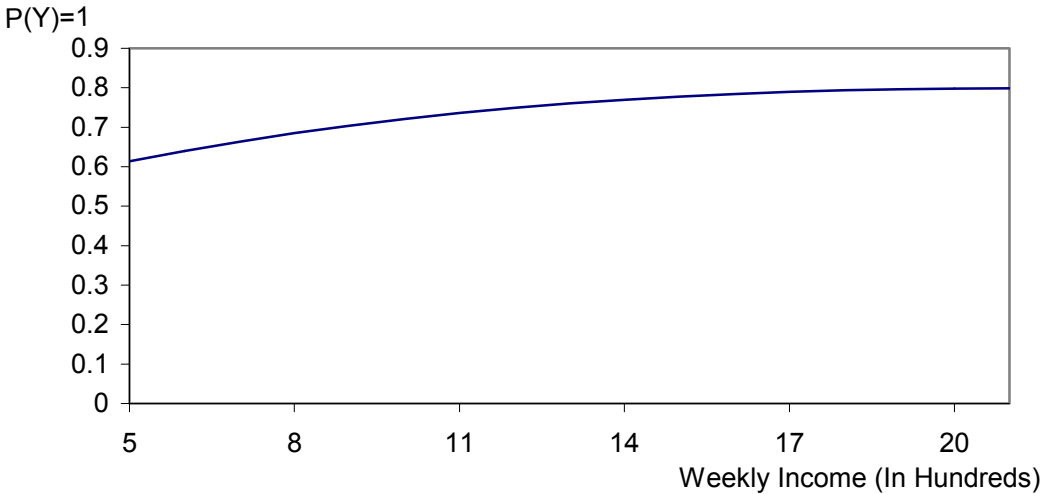
Source: Authors' calculations based on the results reported in Table 3

It can be observed from Figure 5 that the marginal percentile increase in the probability of owning a home falls as household income increases. In other words, individuals have the greatest propensity to change the likelihood that they will purchase a home when their weekly household income increases along the 0-1200 hundred dollar interval. As household income goes beyond this interval, the changes in the probability of owning a home are quite small.

Referring to Table 4, being married increases the probability of owning a home by approximately 14 percentage points. When comparing this result to that for the other variables, it is observed that the impact of marriage on the home ownership decision is particularly strong. Having children also has a significant impact on the decision to purchase a home, being associated with an increase in the probability of owning a home of approximately 7 percentage points. Finally, the results show that there is a greater likelihood of owning a house when an individual lives in a family household.

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The logit estimates and the calculated partial effects for the Australian born, ENGC and NENGC are also presented in Tables 3 and 4. There is a broad similarity between the results for the Australian born and immigrants from the ENGC. However, the coefficients of the NENGC immigrants are typically different from those for the other two birthplace groups, and the discussion that follows will concentrate on these differences.

Perhaps the largest difference between the results for NENGC and the other two birthplace groups is in relation to the impact of the education variable. Among immigrants from the NENGC, the higher the level of educational attainment, the lower the chance of owning a home. This is inconsistent with the literature.

Dividing the NENGC sample set by academic qualifications, as shown in Table 5, it is observed that EDUC does not have a monotonic relationship with the probability of home ownership. In fact, approximately 78 percent of the NENGC population who have less than twelve years of education own their own homes. Among those with exactly 12 years of education, the home ownership rate is only 64 percent, and it is only 63 percent for immigrants from non-English-speaking countries who hold a Higher Degree. This suggests that the negative coefficient on the EDUC variable for immigrants from non-English-speaking countries is linked to characteristics of the groups with fewer than 12 years of schooling. One possibility is that it reflects differences across birthplace groups (that differ by level of education and home ownership patterns). This possibility is investigated below. The home ownership decision could also be linked to cohort effects, as many of the less skilled immigrants are from earlier arrival cohorts, and predominantly from Europe. A study of cohort effects, which would involve linking together data files from several censuses, is beyond the scope of this study, and will not necessarily provide the clarifications needed (see Miller and Neo (2003)) for discussion.

Table 5
Home Ownership and the Level of Education for those born in non-English Speaking Countries

	Higher Degree[a]	Bachelor Degree	Advanced Diploma	Certificate	12 years of schooling	<12 years of schooling
Probability of Owning a Home	0.63	0.63	0.65	0.69	0.64	0.78
Number of Observations	465	1001	468	562	1277	2197
Total number of observations	5970					

Source: Authors' calculations based on the 2001 Population and Housing Unit Record File.
Note: (a) Higher degree refers to Postgraduate and Graduate Diploma qualifications.

Comparing the remaining estimated partial effects for the NENGC and the Australian born, there are significant deviations for the AGE, ENGP, INCOME, KIDS and FAMILY variables.

The difference in the effect of age on the home ownership decision of the two groups is, however, quite modest, with the probability of home ownership for the Australian born increasing more (by about one-third of a percentage point) with each year of age than that for the NENGC immigrants. The patterns of effects for the FAMILY and KIDS variables are diverse, with the foreign born from non-English-speaking countries being more likely than the Australian born to be home owners if they live in a family environment, and being less likely to be a home owner if they have children living with them. Finally, the income variable has a smaller impact on the home ownership decision of the foreign born from non-English-speaking countries than it has on the home ownership decision of the Australian born.

The likelihood of immigrants from both English-speaking and non-English-speaking countries owning their home rises with duration of residence in Australia. While the duration of residence effect for immigrants from English-speaking countries is slightly stronger than that for immigrants from non-English-speaking countries, the difference is not statistically significant, and in any case it appears to be merely off-setting the slightly larger initial

disadvantage in home ownership rates among immigrants from English-speaking countries.[7] Consequently, for both groups of immigrants, the rate of home ownership is about the same as that for the Australian born after around 20 years in Australia (see Figure 2).

V. DECOMPOSITION ANALYSIS

The differences between the mean rates of home ownership of the foreign born and that for the Australian born documented in Table 1 can be broadly decomposed as being due to: (i) differences in coefficients, or behavioural differences, and (ii) differences in endowments.

The coefficients effect captures behavioural differences between the birthplace groups, discrimination on the supply side of the housing market, and important omitted factors that are correlated with birthplace. Such factors could include employment history, credit history, and the cultural disposition towards home ownership (Wachter and Megbolugbe (1992, p. 338), as cited in Bourassa (1995)).

The endowment effect refers to the impact on the mean rate of home ownership associated with differences between birthplace groups on the basis of income, age and the other explanatory variables used in the model of home ownership employed in this paper (see equation 4).

There are a number of ways of undertaking this type of decomposition when the underlying coefficients are obtained using a logit model. The method proposed here is based on Farber (1990). Hence, let $\widehat{Y}^{B|A} = \sum_{j=1}^{n} F(x_j^B \beta^A)$ be the mean predicted rate of home ownership for group 'B' obtained by applying the estimated logit coefficients from group A to group B's characteristics. This computation would inform on the expected rate of home ownership for group B if they were to "behave" in the housing market the same as group A. In forming this

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[7] An empirical regularity in the immigration literature is that the post-arrival improvement in immigrant outcomes is strongest for those with the largest initial disadvantage.

hypothetical value, calculations are undertaken for each member of the relevant sample, and the average of the calculations obtained.

Three calculations are needed for the decomposition:

$$\hat{Y}^{A|A} = \sum_{j=1}^{n} \frac{F(X^A \hat{\beta}^A)}{n} = \text{actual rate of home ownership of group A,}$$

$$\hat{Y}^{B|B} = \sum_{j=1}^{n} \frac{F(X^B \hat{\beta}^B)}{n} = \text{actual rate of home ownership of group B,}$$

$$\hat{Y}^{B|A} = \sum_{j=1}^{n} \frac{F(X^B \hat{\beta}^A)}{n} = \text{hypothetical rate of home ownership of group B assuming they}$$

$$\text{"behave" the same as group A.}$$

Then the difference in the mean rates of home ownership for two groups may be decomposed as follows:

$$[\hat{Y}^{B|B} - \hat{Y}^{A|A}] = [\hat{Y}^{B|B} - \hat{Y}^{B|A}] + [\hat{Y}^{B|A} - \hat{Y}^{A|A}] \tag{5}$$
$$\quad \text{(i)} \qquad\qquad \text{(ii)} \qquad\qquad \text{(iii)}$$

where

(i) = difference in the mean rates of home ownership of the two groups,

(ii) = coefficients effect: the part of the difference recorded in (i) that cannot be accounted for by differences in characteristics, and is typically associated with behavioural differences or discrimination,

(iii) = endowment effect: the part of the difference recorded in (i) that arises simply because of differences in the characteristics or endowments of the two groups.[8]

In the application of this decomposition that follows there is a complication in that the duration of residence variable in equation (4) is relevant only for the foreign born. In a study of the gender wage gap, where there was a variable "home time" that was entered into the estimating equation for females only, Miller (1987) dealt with this by adding a separate "home

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[8] This decomposition is subject to index number and other problems.

time" component to the decomposition. Similarly, a duration of residence or adjustment effect can be added to the decomposition outlined in (5), as follows:

$$[\hat{Y}_{RES=a}^{B|B} - \hat{Y}^{A|A}] = [\hat{Y}_{RES=a}^{B|B} - \hat{Y}_{RES=0}^{B|B}] + [\hat{Y}_{RES=0}^{B|B} - \hat{Y}_{RES=0}^{B|A}] + [\hat{Y}_{RES=0}^{B|A} - \hat{Y}^{A|A}] \tag{6}$$
$$\quad\text{(i)} \qquad\qquad\qquad \text{(ii)} \qquad\qquad \text{(iii)} \qquad\qquad \text{(iv)}$$

where the subscript "*RES=a*" indicates the computations for the foreign born are undertaken for the actual duration of residence, and the subscript "*RES=0*" indicates that the computations are for the foreign born, treating them all as recent arrivals. The components in the decomposition therefore become:

(i)   difference in the mean rates of home ownership of the two groups,

(ii)   immigrant adjustment effect that occurs with duration of residence in Australia,

(iii)   coefficients effect, capturing behavioural and other differences between recent arrivals and the Australian born,

(iv)   endowment effect, which records the part of the difference recorded in (i) that arises because of differences in the endowments of the two groups.

In the application that follows, group A is the Australian born and group B, in the first instance, is either the foreign born from English-speaking countries or the foreign born from non-English-speaking countries. Relevant results are reported in panel A of Table 6.

For both immigrants from English-speaking countries and non-English-speaking countries, there are pronounced differences in the coefficients (principally the constant terms) in the estimated equations so that, even if the foreign born had the same endowments as the native born when they arrived in Australia, they would still have rates of home ownership far below that of the native born. For immigrants from English-speaking countries, the difference is 40 percentage points, while for immigrants from non-English-speaking countries the difference is 32 percentage points. The fact that this "coefficients effect" is largely associated with the constant term indicates that it is capturing aspects of the immigration experience. It takes time to identify a suitable location and to search for suitable housing.

Table 6
Decomposition into Coefficients, Adjustment and Endowment Effects

Birthplace	Observed Home Ownership Rates (i)	Coefficients at Arrival (ii)	Adjustment (iii)	Endowment (iv)
Panel A				
ENGC (3,828 observations)	0.685	-0.401	0.327	0.050
NENGC (5,970 observations)	0.695	-0.317	0.290	0.013
Panel B				
Germany (260 observations)	0.788	-0.367	0.358	0.094
Italy (411 observations)	0.881	-0.469	0.543	0.098
Greece (240 observations)	0.888	-0.054	0.168	0.065
Vietnam (379 observations)	0.747	0.090	0.045	-0.100
Philippines (134 observations)	0.627	-0.287	0.171	0.034
China (323 observations)	0.712	-0.202	0.256	-0.051
Australia (25,170 observations)	0.709			

Source: Authors' calculations based on the 2001 Census of Population and Housing Unit Record File.
Note: Probabilities are approximated to 3 decimal places.

The impact of this adjustment is recorded in column (iii). This column shows that the immigrant adjustment phenomenon captured by the duration of residence variable accounts for a 33 percentage point improvement in home ownership rates for the immigrants from English-speaking countries in the sample, and a 29 percentage point improvement in home ownership rates for the immigrants from non-English-speaking countries. The adjustment effect falls short of completely off-setting the coefficients effect because the typical immigrant has resided in Australia for only 16 years, whereas immigrant catch-up (to the housing circumstances of the typical Australian-born person) was shown in Figure 1 to take about 20 years.

Finally, the endowment effect is recorded in column (iv). It is modest in comparison to the coefficients at arrival and adjustment effects, being five percentage points for immigrants from English-speaking countries and only 1.3 percentage points for immigrants from non-English-speaking countries. This shows that both groups of immigrants have slightly more of the characteristics (*e.g.* age, educational attainment) that are associated with a higher probability of home ownership.

Separate analyses were also undertaken for a number of the major birthplace groups, and the results are presented in Panel B of Table 6. These show that many birthplace groups (*e.g.*, Germany, Italy, Greece) have rates of home ownership in excess of that of the Australian born. Others, such as Philippines, have relatively low rates of home ownership. The reasons for these differences vary across the birthplace groups.

While recent arrivals from Germany and Greece are particularly disadvantaged in terms of home ownership rates, there is impressive adjustment, with the adjustment effect essentially offsetting the coefficients at arrival effect for immigrants from Germany, and surpassing the coefficients at arrival effect for immigrants from Italy. For both immigrants groups there is also a sizeable (almost 10 percentage points) endowment effect. The combination of the sizeable endowment effect and the particularly strong adjustment effect results in immigrants from Italy having a mean home ownership rate fully 17 percentage points above that of the Australian born. The rate of home ownership of immigrants from Germany exceeds that of the Australian born by about the amount of the endowment effect.

Among immigrants from Greece, a distinguishing feature of the decomposition is the modest coefficients at arrival effect, of only -5.4 percentage points. Consequently, even though the adjustment effect for this group is minor compared to that of other European immigrants, and the endowment effect is only 6.5 percentage points, the end result is a mean rate of home ownership 18 percentage points above that of the Australian born.

There is also considerable heterogeneity across the three Asian birthplace groups for which separate analyses could be conducted. The main feature is the positive coefficients at arrival effect for immigrants from Vietnam – and this may be associated with assistance given to those who entered Australia on a Humanitarian visa – and the negative endowment effect for immigrants from Vietnam and China.

Clearly, given this heterogeneity study of home tenure choice requires study on a birthplace-by-birthplace basis. It also requires distinguishing between the coefficients at arrival effect and the adjustment effect via a decomposition such as that developed in this paper.

An interesting issue is why the endowment effects for the various birthplace groups differ. To show this it would be useful to be able to attribute the explained portion to specific variables. In the conventional decomposition, based on equations estimated by ordinary least squares, this is straightforward, as the effects of the various variables are separable (see, for example, Blinder (1973), Oaxaca (1973)). With the logit model, however, the effects of the variables are not separable, which requires an approximation. Even and Macpherson (1993), Doiron and Riddell (1994) and Nielsen (1998) provide methods for making such allocation. The method that is used below is based on Even and Macpherson (1993) and involves weighting the explained component by $\dfrac{(\bar{x}_j^A - \bar{x}_j^B)\widehat{\beta}_j^A}{\displaystyle\sum_{j=1}^{J}(\bar{x}_j^A - \bar{x}_j^B)\widehat{\beta}_j^A}$ where j denotes the jth explanatory variable. Results from these calculations are presented in Table 7.

The Table 7 results are dominated by two variables: age and English proficiency. For all birthplace groups other than Vietnam and the Philippines, there are sizeable age effects (that should lead the particular foreign born group to have relatively high rates of home ownership (because the typical immigrant from these birthplace groups is older than the typical Australian born person), and an older age is associated with higher rates of home ownership. The age effects for Vietnam and the Philippines are negligible. For immigrants from Greece, Vietnam and China, limited English skills are associated with lower rates of home ownership.

Table 7
Explanatory Power of Observed Characteristics

Variable	ENGC	NENGC	Germany	Italy	Greece	Vietnam	Philippines	China
Age	-0.047	-0.030	-0.093	-0.108	-0.120	0.003	0.006	-0.033
English Proficiency	0.000	0.026	0.001	0.026	0.051	0.106	0.003	0.092
Educational Attainment	-0.002	-0.004	-0.002	0.007	0.009	-0.001	-0.011	-0.011
Income	-0.005	0.006	-0.004	-0.005	0.004	0.021	-0.012	0.029
Married	-0.001	-0.005	-0.003	-0.015	-0.013	-0.008	-0.005	-0.006
Children	0.004	-0.004	0.009	0.002	0.007	-0.018	-0.012	-0.017
Family	-0.000	-0.001	-0.000	-0.004	-0.004	-0.003	-0.002	-0.003
Total	-0.050	-0.013	-0.094	-0.098	-0.065	0.100	-0.034	0.051

Note: Column figures may not sum to total due to rounding.

V. CONCLUSION

Home ownership rates among recent immigrants in Australia are far lower than those of the Australian born. The ENGC and NENGC immigrants, however, have similar home ownership rates. The likelihood of immigrants owning a home increases as the duration of their stay in Australia lengthens. It takes roughly 20 years for immigrants to "catch-up" to the home ownership rate of the average Australian-born person. When more disaggregated analyses were undertaken, it was found that the actual home ownership rates for Italians and Greeks were the highest among the immigrant groups. The decomposition developed, which distinguished between the effects of "coefficients at arrival", "immigrant adjustment" and "endowments", provided a framework within which these differences could be analysed. It showed vividly the strength of the immigrant adjustment phenomenon in the Australian housing market.

The importance of immigrant adjustment has been stressed in the overseas research. Chiswick and Miller (2003), for example, show that in the US, immigrants take several decades to achieve home ownership rates comparable to those of the native born. This catch-up period is about five years longer than the time it takes for immigrants to catch up with the earnings of the native born in the US. Thus it appears there is a lagged relationship between earnings and purchasing a home in the United States.

This type of lagged relationship does not exist in Australia. Miller and Neo (2003) show that the "catch-up" time for immigrant earnings is 31 years, double the length of time for catch-up in the US labour market. This compares with "catch-up" of about 20 years in the housing market. Thus, in terms of home tenure choice, the rate of adjustment is relatively faster in Australia, than in the US.

The overall findings broadly support Chiswick's (1978 and 1979) model of immigrant adjustment. However, Chiswick's model does not offer any explanations for the similarity in home ownership adjustment for those born in English-speaking and non-English speaking countries that was reported here for Australia, and why certain immigrant groups from non-English speaking countries have higher home ownership rates. Perhaps the model will need to be modified to give explicit recognition of the role of networks in housing choices. The recent literature on ethnic networks will provide a useful foundation for such modifications (see, for example, Chiswick and Miller (2005) and the references therein).

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