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LABOUR SUPPLY OF IMMIGRANT WOMEN IN AUSTRALIA

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Labour supply of immigrant women in Australia*

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Abstract

This study investigates the labour supply structure of immigrant women in Australia using the 1990 Income Distribution Survey. It was deduced that immigrant women from non-English-speaking backgrounds (NESB) have a lower probability of being employed but among the sub-sample of employed women, they work more hours per year than that of Australian-born women or immigrant women from English-speaking backgrounds (ESB). Despite a high level of educational attainment, NESB immigrants are under-represented in high value-added occupations (e.g. professional, managerial and administrative) and over-represented in manufacturing industries which are subject to intense global competition. Labour supply of a woman from an NESB is insensitive to market incentives (wages) but highly sensitive to non-market incentives (government benefits). Government benefits, however, have no adverse impact on the labour supply of a woman from an ESB background. It is pertinent that the Howard government's new legislation has made immigrants ineligible for government benefits for the first two years of settlement in Australia. This study indicates that this legislation will induce immigrant women from non-English-speaking backgrounds to participate in employment and work longer hours.

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1. Introduction

The debate over immigration has generated a large body of literature in the last two decades in Australia. The economic literature on immigration has focused primarily on the labour market performance of male immigrants and macro-economic impacts of immigration in Australia.¹ Although the literature covers a wide range of issues, the labour market performance of female immigrants in Australia is an under-researched area.

An empirical analysis of the labour supply structure of foreign-born married women is important for several reasons. Firstly, most women immigrants arrive in Australia as spouses or dependants, and they are not subject to a skills test. Hence, their skills may not be a suitable match for the Australian labour market.² Secondly, in recent years immigration from countries with low female participation in the labour force has increased significantly. In the last 35 years, Australia, like other western nations, has experienced a dramatic increase in female participation in the labour force, while the vast majority of women in less developed countries (LDCs) have still been engaged in non-market activities.³ Hence, it is important to examine whether the recent change in the composition of immigrant intake in favour of LDCs has contributed to a change in labour market performance of immigrant women in Australia. Thirdly, foreign-born women who lack Australian labour market experience, and perhaps were not subject to a skills test, are likely to compete for low wage occupations/industries which are already crowded with female workers. Thus their labour market activities might affect employment opportunities and wages of native-born women with comparable characteristics. Finally, labour supply decisions of immigrant women may be influenced by the potential "double negative effect" on their earnings, resulting from the combined adverse effects of gender and birthplace on wages.⁴ Therefore, a study of the labour supply structure of immigrant women may be useful for devising ways of effectively utilising immigrant

human capital.

This paper investigates the labour supply pattern of foreign-born married women. To date, all Australian studies on immigrant labour supply have used a reduced-form Probit or Logit model to investigate labour market participation. In the Australian context, the unique features of the present study are: the estimation of a structural labour supply model, rather than a reduced-form model of labour force participation; the use of 'annual hours worked' as the measure of labour supply, rather than a dichotomous variable for labour market participation; and the use of the 1990 Australian Income Distribution Survey. The paper is organised as follows: Section 2 presents stylised facts on immigrant labour supply; Section 3 reviews the literature; Section 4 provides the model and a discussion of empirical issues; Section 5 discusses the empirical results; and Section 6 summarises the major findings of the study.

2. Stylised Facts

In Australia, the labour market performance of immigrant women has changed significantly since the early 1980s. Immigrant women had higher labour force participation rates than their native-born counterparts in the 1970s. The native-immigrant participation gap decreased significantly over the first half of the 1980s, and native-born women surpassed the participation rates of immigrant women in 1985-86. Thus, in the Australian historical context, the mid-1980's was a turning point in the labour supply behaviour of immigrant women *vis-a-vis* native-born women. Participation rates for native-born women increased from 40 percent to 54.2 percent over the time span 1972-90, while participation rates for immigrant women increased from 46.5 percent in 1972 to only 49.8 percent in 1990 (ABS, 1992). The change in the composition of the immigrant intake was an important factor contributing to the slow

growth of labour force participation of foreign-born women. Immigration from non-English speaking countries has increased substantially since the mid 1980s due to the enforcement of a Canadian-style universal point test for immigration. According to an ABS (1992) report, in 1989-90, 63 percent of female immigrants originated from non-English speaking countries; and they had lower participation rates (45.5 percent) compared to both the native-born (54.2 per cent) and the foreign-born from an English-speaking background (55.7 percent).⁵

Both the unemployment rate and the duration of unemployment were higher among foreign-born women. Indeed, the difference between immigrant and native unemployment rates increased from 0.7 percent in August 1972 to 2.2 percent in November 1990. This trend evolved from a higher incidence of unemployment among immigrant women from a NESB than that of immigrant women from an ESB (ABS, 1992). Among employed women, immigrants are over-represented in full-time employment and they work longer hours than their native-born counterparts. More specifically, in November 1990, 52 percent of native-born women worked more than 35 hours, while 60.3 percent of immigrant women from a NESB and 55.3 percent of immigrant women from an ESB worked more than 35 hours per week (ABS, 1992).

3. Literature Review

Several studies in Australia attempted to explain the observed differences in labour market status by birthplace. Brooks and Volker (1985) estimated a reduced-form multinomial Logit model of labour force destinations (employed, unemployed, not in the labour force) using 1981 Census data. Their results indicated that immigrant women were more likely to be employed than native-born women with comparable labour market characteristics. The unemployment rate was positively associated with the lack of proficiency in English. However, language difficulties had a less pronounced effect on female unemployment than

on male unemployment. Brooks and Volker also estimated a gender-specific Ordered Probit model of labour supply. The dependent variable is ordered in accordance with the 1981 Census breakdown of hours: unemployed (0 hours), 1-14, 15-24, 25-34 and more than 34 hours. Their Ordered Probit model included Birthplace, English Speaking Ability and Period of Residence in Australia, among other explanatory variables. The results suggested that the degree of female participation in the labour force increased with the years of residence in Australia and decreased with the spouse's income and the presence of young children. In addition, they observed that the probability of hours worked by a woman was weakly associated to her birthplace.

As the composition of immigrant intake changed significantly after 1981, studies based on more recent data observed that foreign-born women had a lower probability of participation in the labour market than their native-born counterparts (e.g. Wooden, 1990; Foster and Baker, 1991; and Ackland and Williams, 1992). English proficiency and demographic structure were identified as major factors contributing to the variation in labour force participation rates across birthplace groups. Wooden and Robertson (1989) attempted to explain labour force participation rates using a multinomial Logit model similar to that of Brooks and Volker (1985). Their results suggest that immigrants from a NESB (except Vietnamese) are less likely to participate in the labour force than immigrants from an ESB.

Interestingly, Inglis and Stromback (1986) found that English proficiency was an important factor in determining male employment but had no significant effect on the probability of female employment. The latter can be partly explained by the fact that women with language difficulties compete for jobs in industries (e.g. textile, footwear and clothing, cleaning, child care etc) which do not require a high level of proficiency in English. Miller (1986), Wooden and Robertson (1989) and Stromback *et al* (1992) observed a higher likelihood of unemployment among refugees than other immigration categories. This finding

is not surprising because refugees are granted permanent residence status based on humanitarian grounds rather than upon their labour market skills.

Ross and Saunders (1993) investigated the labour force participation of sole and married mothers in Australia employing a Probit model of labour market participation. Using the 1986 Income Distribution Survey, they observed that the labour supply response of a sole mother is similar to that of a married mother with respect to most labour market signals. The labour supply of a sole mother, however, is more sensitive to government transfer payments than that of a married mother. Their estimate of the partial impact of government transfer payments on labour supply might be imprecise due to the strong correlation between government benefits and the status of the mother (sole mother *vis-a-vis* married mother). Furthermore, an investigation of the impact of birthplace on labour supply, was beyond the scope of their study.

4. The Model and Empirical Issues

Model

This study adopts a 'second-generation' model of labour supply, as discussed in Killingsworth (1983). The distinguishing features of the second-generation model are: an explicit treatment of sample selection bias and the dealing with the problem of endogeneity of wages in the estimation of a labour supply function. The sample selectivity-bias arises from the exclusion of individuals who don't work, while the endogeneity problem arises from the correlation between unobserved factors (abilities, motivation etc) which affect wages and unobserved factors which affect labour supply. The following Tobit model of labour supply is used for empirical analysis:⁶

$$\begin{aligned}
(1) \quad I_{fi}^* &= X_{fi} \alpha + u_i \\
(2) \quad h_{fi} &= a_0 + a_1 \ln(w_{fi}) + a_2 y_i + b' Z_i + e_i \\
(3) \quad h_{fi} &= h_{fi}^* \quad \text{if } I_j^* > 0 \\
&= 0 \quad \text{if } I_j^* \leq 0
\end{aligned}$$

Equation (1) explains net benefit from employment (I^*); $X_{fi}\alpha$ is the expected net benefit from working, which is defined as the difference between the log of market wage and the log of reservation wage. The second equation explains the wife's annual hours worked (h_{fi}) in terms of her market wage (w_{fi}), family income (y_i), exclusive of her labour income, and a vector of observable characteristics (Z_i). This specification allows the wage elasticity to vary inversely with the wife's hours of work. Equation (3) indicates that the wife's labour supply reduces to zero whenever her net benefit from employment is non-positive. Thus labour supply is observable when $I^* > 0$. The error terms, e_j and u_j , have joint log normal distribution and they are distributed independently and identically with mean 0, variances $\sigma_e^2 = 1$ (a normalising assumption) and σ_u^2 , and covariance $\rho \cdot \sigma_u$. An individual participates in the paid employment sector, when $I^* > 0$ and does not participate when $I^* \leq 0$. Since net benefit I^* is unobservable, the selection equation (1) is approximated by using a dichotomous variable defined as:

Instead of using the Heckman's two-stage estimation procedure, the labour supply equation and the participation equation are estimated simultaneously applying the maximum likelihood estimator. This procedure yields more efficient estimates of the parameters than that of the Heckman's two-stage procedure. The likelihood function for the model can be written as:

$$(5) \quad L = \prod_{j \in \Omega} P(I_j > 0) f(h_{fi} | I_j > 0) \prod_{j \in \Omega'} P(I_j \leq 0)$$

where Ω and Ω' represent the sub-samples of workers and the unemployed respectively; $f(h_{fi} | I_j > 0)$ is the density function for annual hours worked conditional on the positive net benefit of paid employment. In order to overcome the endogeneity problem, resulting from the correlation between unobserved factors (abilities, motivation etc) which affect market wages and unobserved factors which affect labour supply, the actual wage in the hours worked equation is replaced by the predicted wage. The predicted wage is obtained from the maximum likelihood estimate of the market wage equation (see the Appendix).

Data

The empirical analysis is based on the 1990 Survey of Income, Housing Costs and Amenities, which includes 9,567 married females. From the sample of married females, a sub-sample of 7,243 persons is selected based on the following selection criteria: aged 21 to 64 years; not permanently unable to work, full time students, unpaid voluntary workers or family helpers. Of the 7,243 married women, the number of immigrant women is 2,173.

Labour supply is measured as the annual number of hours worked in 1989-90, which is the product of the annual number of weeks worked and the number of hours worked per week in main and second jobs.⁷ The wife's hourly wage is obtained by dividing her annual employment income by the annual number of hours worked. Descriptive statistics of the estimation samples are depicted in Table 1. The incidence of employment is only 42 percent for NESB immigrants but 53 percent among natives and ESB immigrants. In 1989-90, on average, NESB immigrants worked 168 hours less than ESB immigrants and 151 hours less than natives. However, these differences disappear when the sub-sample of employed

women is considered. Among employed women, NESB immigrants worked slightly more hours and earned lower wages than did other birthplace groups. NESB immigrants received more government benefits and less family earnings (exclusive of the wife's employment income) than both the native-born and the ESB immigrant population. Furthermore, a typical immigrant woman from a non-English background is older than a typical native-born woman but has a higher probability of having a university degree. Despite a higher level of educational attainment, NESB immigrants are under-represented in high value-added occupations (e.g. professionals, managers and administrators) and over-represented in manufacturing industries which are subject to intense global competition.

Please See Table 1

5. The Results

The empirical analysis of labour supply behaviour was conducted at two levels. Firstly, a single labour supply equation was estimated for the whole sample of women under the assumption that economic and demographic characteristics affect the labour supply behaviour of Australian-born and foreign-born women identically. A set of dummy variables for birthplace was included in the basic labour supply function to estimate partial impact of birth status on labour supply. In addition, an equation incorporating the dummy variables for arrival period was estimated to capture the joint impact of Borjas' so called 'cohort quality' and 'years since migration' variables. Secondly, the assumption of the identical parameter vector by birthplace was relaxed and a birth status-specific labour supply equation was estimated.

The estimation procedure was as follows. Firstly, the labour market participation and wage equations were estimated simultaneously using the maximum likelihood estimation technique⁸. Then, the log of hourly wage was predicted from the wage equation for use as an instrumental variable in the labour supply function. Finally, the labour market participation

and labour supply models were estimated jointly by maximising the likelihood equation (5). The results for the labour market participation equation are provided in the Appendix. Estimated labour supply equations are presented in Table 2.

Results for the combined sample

All labour supply equations include a common set of economic-demographic controls to estimate the partial effects of birthplace and arrival periods on labour supply. These are: predicted log of hourly wage; annual family income; annual government benefits; mortgage debt; education; the wife's age; number and ages of children; place of residence in Australia; and a dummy variable for cross-ethnic marriage which takes the value of unity if the wife's birth place is different from that of her husband, and zero if it is the same. After netting out the effects of these variables, it was observed that the labour supply of immigrant women from English-speaking backgrounds is not significantly different from that of Australian born women. However, NESB immigrant women, who participate in employment, annually work 125 hours more than comparable Australian-born women. The coefficients of the dummy variables for arrival period capture both the assimilation and cohort effects.⁹ An immigrant woman who arrived in Australia between 1985 and 1990 annually works 161 hours less than a comparable Australian-born woman. There is no statistically significant difference between the labour supply of native-born women and that of the pre-1955 and the 1975-84 cohort of immigrants. However, immigrant women who arrived between 1955 and 1974 annually work 89 to 142 hours more than comparable native-born women.

For the combined sample, higher wages and mortgage debt induce women to supply more labour, while government benefits and non-labour income have expected negative influences on hours worked. The coefficients for the dummy variables for age (the reference category is women aged 60-64) suggest that annual hours worked by a typical married

woman decreases at an increasing rate over the age interval 21-64. Labour supply decreases at a decreasing rate with the number of pre-school aged children, which signifies the presence of economies of scale for bringing up young children.

Results for birthplace-specific labour supply functions

The last three equations of Table 2 provide the results for birthplace-specific labour supply functions and the corresponding employment participation equations are delineated in Table A1 in the Appendix. The estimates of the probability of employment participation for obtained for each birthplace group from the last three equations of Table A1. Figures 1 to 5 all portray the predicted probability of employment participation for a woman with the following characteristics: resides in a capital city; married to a person within her ethnic group; receives average levels of family income and government benefits; holds an average amount of mortgage debt and has the mean number of dependant children. Figure 1 reveals the partial impacts of education and birth status on the probability of employment participation for women aged 21-29. Not surprisingly, educational attainment significantly increases the probability of participation. For any level of education, an Australian-born women has a higher probability of obtaining employment than an immigrant woman from an NESB background. Interestingly, an immigrant woman from an ESB background has a better chance of being employed than an Australian-born woman with the same level of education. Figures 2 to 4 show that these key findings are also applicable to married women aged 30-59.

Figure 5, however, portrays a slightly different picture of employment participation for women aged 60-64. Among the cohort university graduates, the probability of being employed is 34 percent for an ESB immigrant, 30 percent for an Australian-born and only 8 percent for an NESB immigrant. On the other hand, among women with a diploma, trade certificate or secondary school certificate, an Australian-born has a significantly higher

probability of employment participation than that of an ESB or an NESB immigrant. It is relevant to note that potential workers aged 60-64 may be eligible for the 'age pension' and subject to an implicit welfare tax. Participation of this age group in employment may mitigate the burden on social security outlay but intensify the competition for certain part-time jobs for young adults.

Please See Figures 1 to 5

With regard to the annual hours worked, as depicted in Table 2, the results suggest that the labour supply structure of both ESB and NESB immigrants significantly differ from that of native-born women¹⁰. The wage effect is positive and statistically significant for native-born and immigrants from English-speaking backgrounds, but insignificant for immigrants from non-English-speaking backgrounds.

As expected, family income induces a woman to work less regardless of her birthplace. For every \$10,000 increase in family income, the annual labour supply of a native-born decreases by 29 hours, an ESB immigrant by 24 hours and an NESB immigrant by 54 hours. Government benefits reduce the labour supply of all but ESB immigrants. It is relevant to note that the Howard government's new legislation has made immigrants ineligible for social security benefits for the first two years of settlement in Australia. These results imply that this legislation will induce immigrant women from non-English-speaking backgrounds to participate in employment and work longer hours.

Family mortgage debt has the expected positive effect on the labour supply for all birthplace groups. For every \$10,000 increase in mortgage debt, the annual labour supply of a native-born increases by 22 hours, an ESB immigrant by 33 hours and an NESB immigrant by 19 hours. Higher education was found to be most effective in increasing the labour supply of immigrants from non-English speaking backgrounds. The age-profile of labour supply is flat for the foreign-born from an ESB, downward-sloping for the native-born and an inverted

U-shaped for NESB immigrants. The number of pre-school aged children (0-4 years) has an expected negative effect on the labour supply of all birthplace groups, while the number of children aged 5-9 reduces the labour supply of a native-born and an NESB immigrant only. Dependent children aged 10 and over have no significant effect on the labour supply of both ESB and NESB immigrants. Dependent children of all ages significantly reduce the annual hours worked for native-born women.

A set of dummy variables for immigrant arrival periods (the reference category is immigrants arrived prior to 1955) is included in the ESB and NESB labour supply functions. For ESB immigrants, none of the coefficients of arrival dummies are statistically significant which indicate that ESB immigrants do not face any significant adjustment difficulties in the Australian labour market. On the other hand, the post-1984 cohort of NESB immigrants work annually 609 hours less than the pre-1955 cohort of NESB immigrants. As the period of residence in Australia increases, the NESB immigrants catch up and even surpass the labour supply of their predecessors.

After netting out the effects of economic-demographic characteristics, it is observed that the labour supply of immigrant women from English-speaking backgrounds is not significantly different from that of Australian born women. However, NESB immigrant women, who participate in employment, annually work 125 hours more than comparable Australian-born women. The coefficients of the dummy variables for arrival period capture both the assimilation and cohort effects.¹¹ An immigrant woman who arrived in Australia between 1985 and 1990, annually works 161 hours less than a comparable Australian-born woman. Immigrant women who arrived between 1955 and 1974, annually work 89 to 142 hours more than comparable native-born women. There is no statistically significant difference between the labour supply of native-born women and that of the pre-1955 and the 1975-84 cohort of immigrants.

Estimates of wage and income elasticities

Table 3 presents estimated wage and income elasticities by birthplace. The wage elasticity of labour supply is 0.83 for the native-born, 0.27 for ESB immigrants and 0.12 for NESB immigrants. For married women aged 15-64, Miller and Volker (1983) observe a wage elasticity of the labour force participation rate of 0.71 which lies within the range of estimates (0.12 to 0.83) of this study. The range of estimates observed in comparable studies, for Canada, Germany and the Netherlands is 0.40 to 1.79 but in the case of the USA the range of estimates is very large (-0.89 to 15.24).¹² The elasticity of labour supply with respect to government benefits, family income and family mortgage debt differ by birthplace. However, these elasticity coefficients are small for all birthplace groups.

Please See Tables 2 and 3

6. Summary and Conclusions

This study investigates the labour supply of foreign-born *vis-a-vis* Australian-born married women using the 1990 Income Distribution Survey. It was deduced that despite a high level of educational attainment, immigrants from non-English speaking backgrounds are under-represented in high value-added occupations (e.g. professional, managerial and administrative) and over-represented in manufacturing industries which are facing intense global competition. NESB immigrant women have a lower probability of being employed but among the sub-sample of employed women, they work more hours per year than do other birthplace groups. In contrast to NESB immigrants, ESB immigrants upon arrival in Australia do not face any adjustment difficulties in the labour markets.

The wage elasticity of labour supply is three times higher for native-born women

than for ESB immigrants and not statistically different from zero for NESB immigrants. On the other hand, labour supply of NESB decreases significantly as government benefits increase but ESB immigrants' labour supply is independent of government benefits.¹³ Since the labour supply of NESB immigrants is insensitive to market incentives (wages) but highly sensitive to non-market incentives (government benefits), one may conclude that reducing government benefits, rather than regulating wages, will induce them to participate in employment and work longer hours. It is pertinent that the Howard government's new legislation has made immigrants ineligible for government benefits for the first two years of settlement in Australia. This study indicates that this legislation may increase labour supply of NESB immigrants but may not influence ESB immigrants' labour supply.

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Figure 1
Predicted probability of employment participation:
Married women aged 21-29

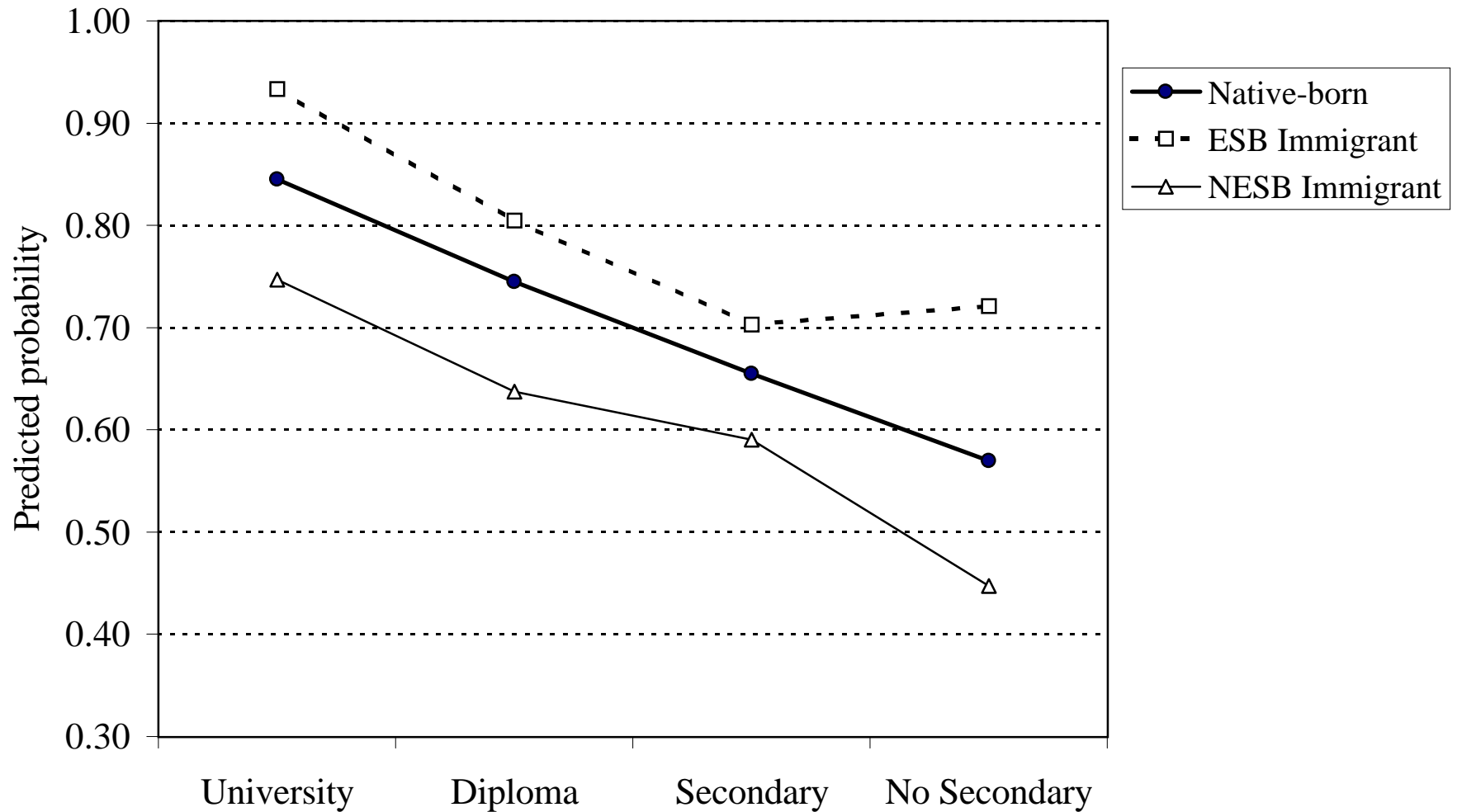


Figure 2
Predicted probability of employment participation:
Married women aged 30-39

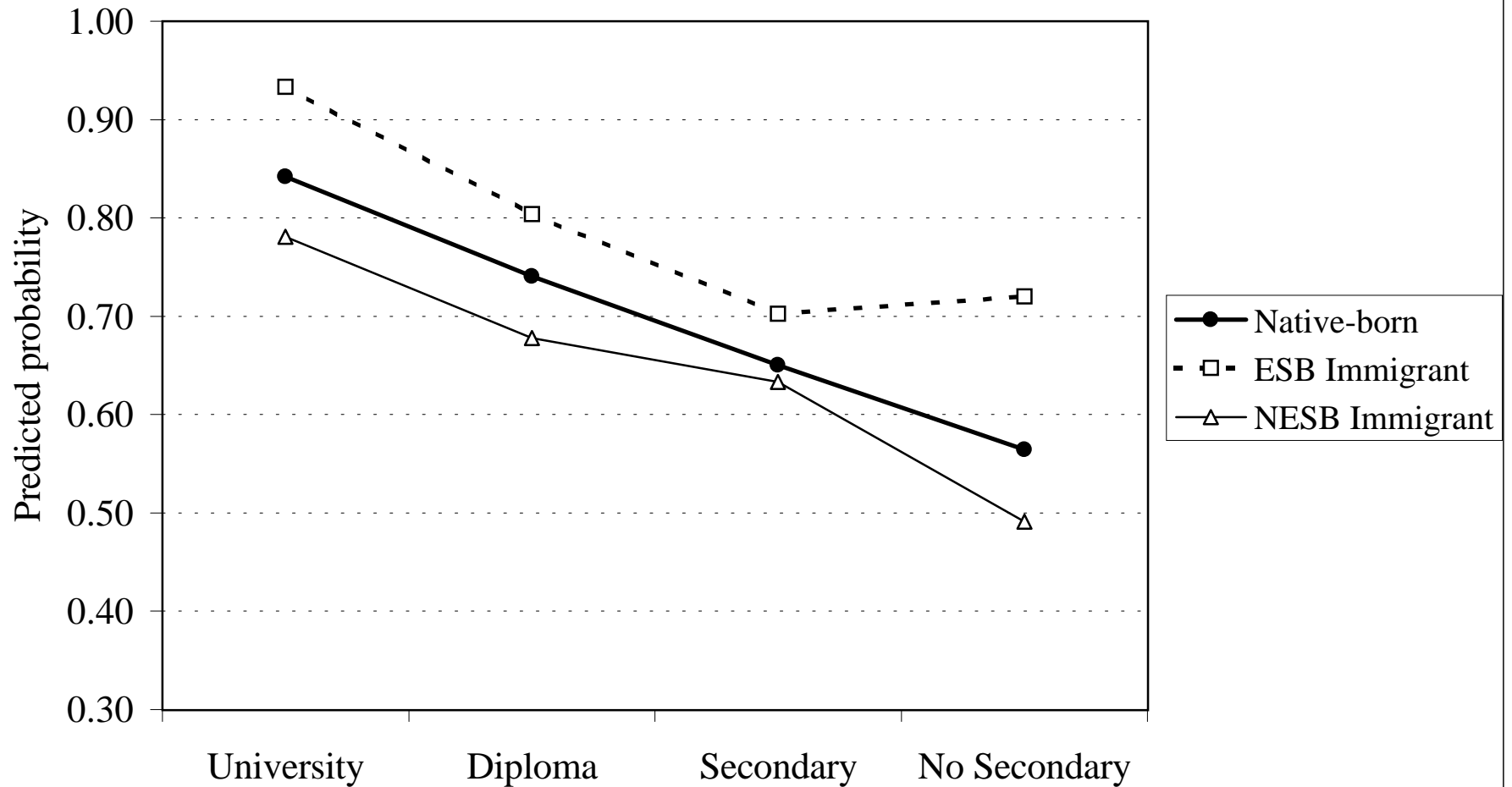


Figure 3
Predicted probability of employment participation:
Married women aged 40-49

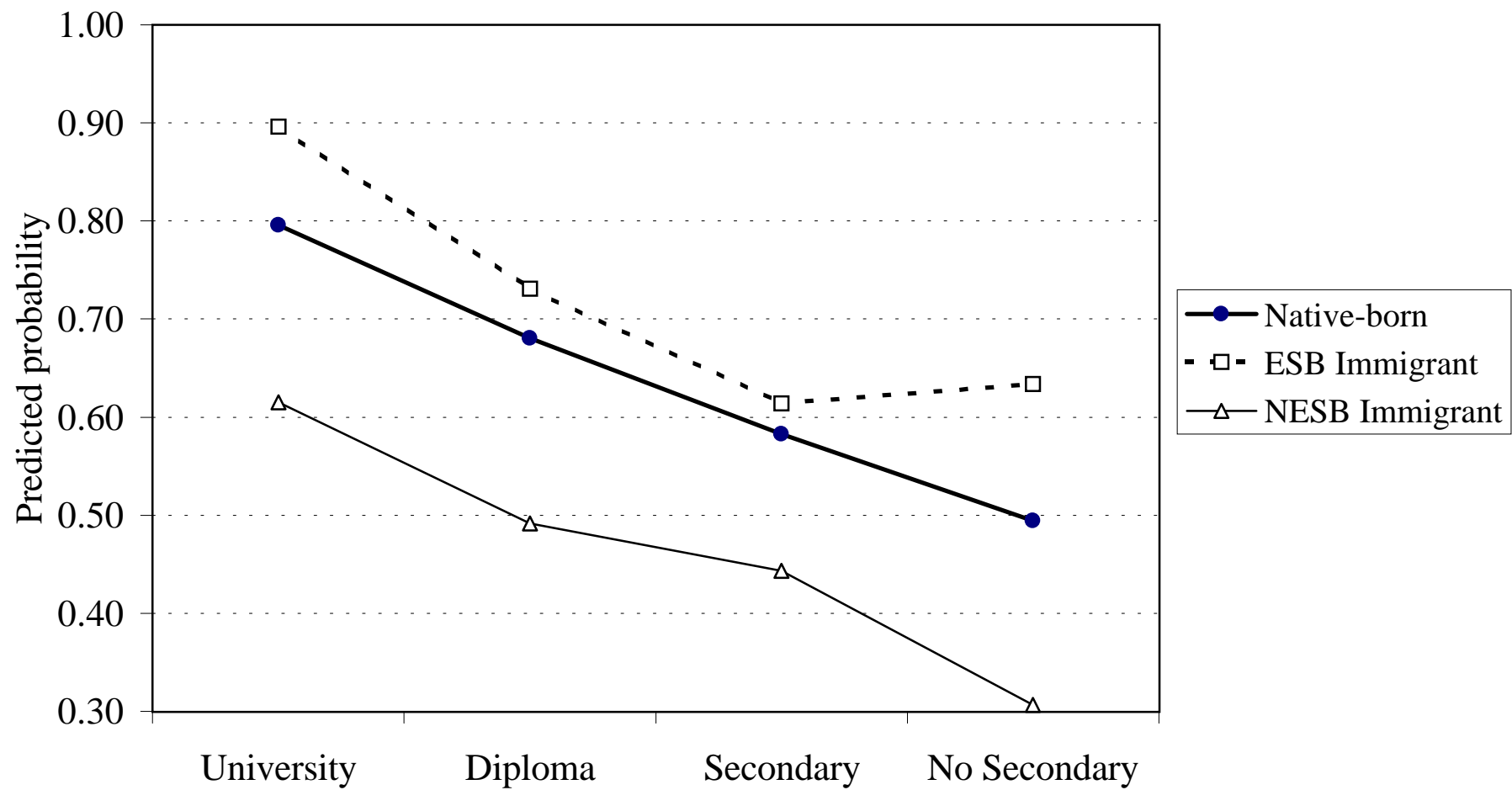


Figure 4
Predicted probability of employment participation:
Married women aged 50-59

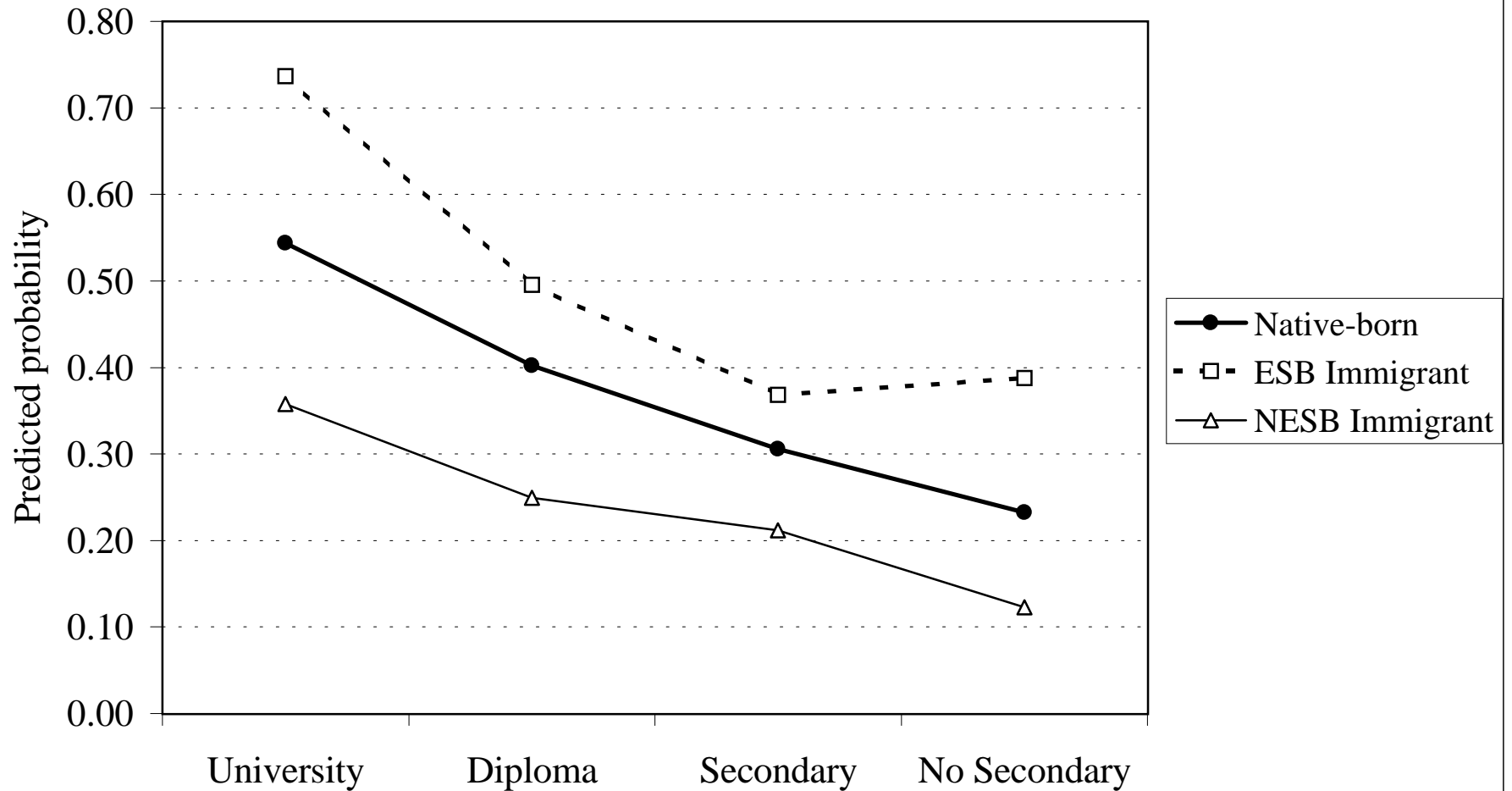


Figure 5
Predicted probability of employment participation:
Married women aged 60-64

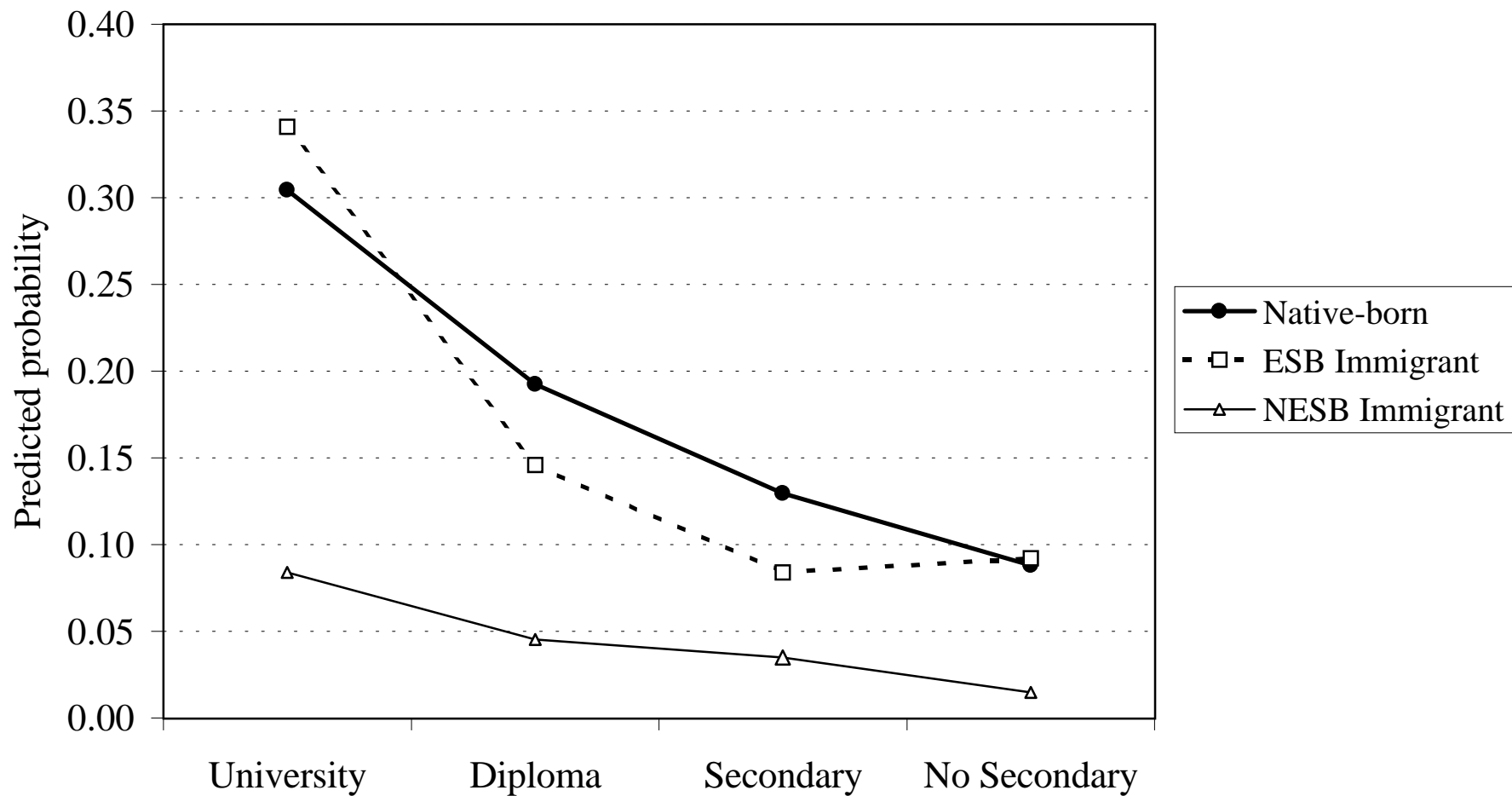


Table 1: Descriptive Statistics of the Estimation Samples

Variable	Full Sample						Sub-sample of employed women					
	Native Born sample: 5070		ESB sample: 963		NESB sample: 1210		Native Born sample: 2708		ESB sample: 513		NESB sample: 506	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Employment rate	0.53		0.53		0.42							
Annual hours	818.09	928.76	835.87	934.15	667.42	896.79	1522.90	729.56	1556.40	709.69	1585.9	673.15
Hourly wage	6.62	7.86	6.78	7.66	4.82	6.37	12.40	6.63	12.72	5.88	11.52	4.45
Annual government benefits	1951	3783	1876	3888	2565	4399	767	1872	595	1327	853	1950
Family income	30573	26950	29714	24438	24672	21561	33310	24526	32315	21422	28903	17815
Family's mortgage debt	15258	28149	17934	29270	14444	33456	20144	31600	22246	29020	20777	38277
Dummy variables for age ¹												
Age21-29	0.23		0.18		0.13		0.25		0.21		0.127	
Age 30-39	0.31		0.28		0.31		0.34		0.31		0.399	
Age 40-49	0.24		0.27		0.30		0.29		0.33		0.354	
Age 50-59	0.15		0.20		0.17		0.10		0.15		0.113	
Number of dependant children												
Children 0-4	0.35	0.66	0.28	0.60	0.27	0.58	0.21	0.52	0.20	0.50	0.23	0.53
Children 5-9	0.32	0.63	0.29	0.62	0.30	0.59	0.30	0.61	0.29	0.63	0.32	0.60
Children ≥10	0.45	0.81	0.43	0.79	0.57	0.88	0.52	0.84	0.47	0.82	0.70	0.92
Dummy variables for education ²												
University	0.07		0.07		0.09		0.11		0.11		0.128	
Diploma or trade certificate	0.31		0.37		0.28		0.37		0.41		0.34	
Secondary	0.11		0.11		0.16		0.11		0.11		0.17	
Dummy variables for occupation ³												
Professionals, managers and administrators	0.12		0.11		0.07		0.20		0.17		0.16	
Para-professionals, trades person	0.07		0.08		0.04		0.11		0.14		0.09	
Clerks, salesperson and personnel service workers	0.34		0.34		0.22		0.53		0.52		0.42	
Dummy variables for industry ⁴												
Mining, electricity, gas and water	0.05		0.04		0.00		0.01		0.08		0.04	
Manufacturing	0.06		0.07		0.12		0.08		0.10		0.23	

Construction	0.02		0.02		0.02		0.02		0.03		0.02	
Wholesale, retail trade, transportation and storage	0.13		0.13		0.09		0.20		0.20		0.15	
Communication, finance, property and business services	0.09		0.09		0.07		0.14		0.14		0.15	
Public administration, defense and community services	0.27		0.28		0.17		0.45		0.46		0.37	
Recreation, personal and other services	0.06		0.05		0.05		0.09		0.06		0.08	
Cross-ethnic marriage ⁵	0.15		0.39		0.18		0.16		0.39		0.24	
Arrived before 1995			0.09		0.13				0.06		0.12	
Arrived 1955-64			0.17		0.20				0.17		0.21	
Arrived 1965-74			0.39		0.28				0.36		0.29	
Arrived 1975-84			0.20		0.21				0.25		0.25	
Arrived 1985-90			0.15		0.18				0.16		0.13	
Capital city	0.58		0.76		0.86		0.61		0.82		0.88	
Dummy variables for place of residence ⁶												
VIC	0.19		0.17		0.27		0.19		0.17		0.28	
QLD	0.21		0.18		0.11		0.20		0.17		0.90	
SA	0.12		0.14		0.09		0.13		0.14		0.09	
WA	0.12		0.23		0.02		0.12		0.25		0.15	
TAS, ACT & NT	0.12		0.09		0.05		0.12		0.09		0.06	

Source: 1990 Income Distribution Survey

Reference categories/notes:

1. Aged 60-64
2. Achieved no qualification since leaving school, did not complete highest year secondary.
3. Plant and machine operators, drivers and labourers and related workers
4. Agriculture, forestry, fishing and hunting
5. Equals 1 if the wife's birthplace is different from that of her husband, zero otherwise.
6. New South Wales

Table 2: Maximum likelihood estimates of labour supply model
 Dependent variable: Annual hours worked

Variable	All women		All women		Native-born		ESB Immigrants		NESB Immigrants	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	-1426.4	-3.92	-1357.6	-3.83	-1609.2	-4.47	331.12	0.28	-1494.3	-2.1
Predicted log hourly wage	1058.3	9.54	1026.2	9.3	1269.1	9.44	411.58	1.97	189.37	0.71
Family income /100	-0.2805	-5.63	-0.2927	-5.79	-0.2857	-5.33	-0.2400	-1.60	-0.5438	-2.33
Annual government benefits	-0.0738	-5.22	-0.0726	-5.14	-0.0703	-6.02	-0.0677	-1.25	-0.1602	-6.97
Family's mortgage debt /100	0.1960	3.48	0.1909	3.45	0.2185	3.83	0.3196	2.39	0.1897	2.04
University	161.60	1.65	203.94	2.07	105.45	1.08	367.91	1.35	689.46	3.45
Diploma or trade certificate	22.90	0.41	36.30	0.64	-1.44	-0.03	174.65	1.59	356.79	2.84
Secondary	111.22	2.52	131.12	2.93	37.24	0.71	232.72	2.05	222.08	1.88
Age 21-29	678.54	3.29	704.30	3.42	388.62	2.1	587.40	0.77	2079.5	5.05
Age 30-39	573.25	2.73	590.65	2.85	236.08	1.27	469.86	0.61	2245.7	5.45
Age 40-49	533.41	2.8	550.57	2.96	164.41	0.96	418.62	0.59	2045.2	5.47
Age 50-59	425.17	3.32	417.55	3.33	48.51	0.4	321.30	0.58	1205.4	3.61
Children 0-4	-781.80	-6.23	-801.46	-6.56	-713.63	-5.96	-866.14	-2.81	-698.95	-3.34
(Children 0-4) ²	174.49	5.07	169.19	4.97	110.34	2.82	236.71	3.11	125.46	1.23
Children 5-9	-207.08	-8.92	-214.63	-9.17	-229.41	-8.94	-85.75	-1.39	-321.74	-4.95
Children >10	-37.03	-2.63	-51.78	-3.69	-35.03	-2.08	-57.88	-1.43	3.65	0.08
Capital city	-42.40	-1.47	-25.06	-0.87	-60.48	-1.97	-33.70	-0.27	287.83	2.37
Cross-ethnic marriage	-92.31	-3.21	-106.33	-3.65	-71.42	-1.89	-131.35	-1.72	-27.54	-0.27
ESB	-5.50	-0.16								
NESB	125.35	2.26								
Arrived before 1955			-61.11	-0.84						
Arrived 1955-64			141.87	2.7			0.35	0.00	314.86	2.32
Arrived 1965-74			88.68	1.83			-25.14	-0.17	120.21	0.92
Arrived 1975-84			24.79	0.53			-186.35	-0.95	107.79	0.75
Arrived 1985-90			-160.52	-1.65			-242.01	-1.60	-609.39	-3.02
σ_1	667.46	19.28	669	19.86	679.22	18.27	625.46	24.41	902.71	9.28
$\rho(1,2)$	0.315	1.18	0.318	1.24	0.422	2.11	-0.0021	-0.0020	0.8462	11.53
Log-Likelihood*	-33329		-33313		-24059		-4548.8		-4649.1	

Note: $\rho(1,2)$ = correlation between disturbance in the labour supply function and disturbance in the selection Criterion; σ_1 = standard deviation of the disturbance in the hours worked equation.

*The labour supply equation and the employment participation equation (see Table A1) are estimated simultaneously by maximising the likelihood function (5) in the text.

Table 3: Elasticity of labour supply
(evaluated at means)

Regressors	Native-born	ESB	NESB
Wage	0.833*	0.265*	0.119
Family income	-0.062*	-0.050	-0.099*
Government benefits	-0.035*	-0.028	-0.086*
Mortgage debt	0.029*	0.047*	0.025*

Sources: Table 2

*Based on statistically significant coefficients.

APPENDIX

Table A1: The Probit model for labour market participation
 Dependent variable : Equals 1 if the wife worked in 1988-89, zero otherwise

Variable	All women		All women		Native-born		ESB Immigrants		NESB Immigrants	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	-1.0125	-10.54	-1.0066	-10.50	-0.9067	-9.10	-1.6504	-3.49	-1.6866	-2.39
University	0.7844	11.60	0.7613	11.40	0.8407	10.06	0.9172	4.49	0.7971	4.99
Diploma or trade certificate	0.4301	11.12	0.4062	10.56	0.4835	10.44	0.2730	2.58	0.4841	4.56
Secondary	0.2014	3.67	0.1923	3.54	0.2238	3.30	-0.0522	-0.34	0.3618	2.79
Family's mortgage debt /10000	0.049	11.91	0.049	11.65	0.060	9.68	0.0251	1.87	0.026	3.11
Family income /10000	--0.020	-2.82	-0.018	-2.66	-0.021	-2.64	-0.0106	-0.51	-0.011	-2.00
Annual government benefits /100	-0.011	-20.26	-0.011	-19.38	-0.011	-16.53	-0.0122	-5.22	-0.012	-7.93
Age 21-29	1.6259	15.88	1.5706	15.48	1.5275	14.19	1.9124	4.32	2.0426	2.76
Age 30-39	1.6179	16.11	1.5914	15.95	1.5140	14.27	1.9107	4.37	2.1535	2.97
Age 40-49	1.3910	14.37	1.3906	14.39	1.3380	13.07	1.6698	3.90	1.6705	2.32
Age 50-59	0.7372	7.59	0.7509	7.74	0.6210	6.04	1.0425	2.45	1.0143	1.41
Children 0-4	-1.0744	-15.19	-1.0643	-15.06	-1.1711	-13.90	-0.9694	-4.99	-0.5621	-3.14
(Children 0-4) ²	0.2146	7.03	0.2163	7.01	0.2300	6.34	0.1999	2.45	0.0860	1.09
Children 5-9	-0.1484	-5.16	-0.1407	-4.91	-0.1381	-3.92	-0.1288	-1.73	-0.1424	-1.91
Children ≥10	0.0009	0.04	0.0117	0.52	-0.0128	-0.47	-0.0474	-0.72	0.1315	2.47
Capital city	0.0998	2.75	0.0992	2.74	0.0675	1.64	0.3081	2.77	0.2335	1.84
Cross-ethnic marriage	-0.0283	-0.66	-0.0291	-0.68	-0.0764	-1.37	-0.0890	-0.82	0.1636	1.40
ESB			-0.0978	-1.92						
NESB			-0.3698	-8.16						
Arrived before 1995	-0.2491	-2.55								
Arrived 1955-64	-0.0388	-0.52					0.2711	1.31	0.0473	0.30
Arrived 1965-74	-0.2142	-3.93					0.1942	1.00	-0.3356	-2.48
Arrived 1975-84	-0.0960	-1.36					0.4721	2.12	-0.3379	-2.04
Arrived 1985-90	-0.7369	-9.63					0.0012	0.01	-1.2002	-6.89
Sample size	7243		7243		5070		963		1210	

Table A2: Maximum likelihood estimates of wage equation
 Dependent variable: Hourly wage

Variable	All women		All women		Native-born		ESB Immigrants		NESB Immigrants	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	1.8962	28.92	1.9020	29.05	1.9395	26.61	1.6787	3.09	1.7636	7.33
Age 21-29	0.1420	3.12	0.1385	3.03	0.1458	2.95	-0.0251	-0.05	0.2351	1.10
Age 30-39	0.1863	4.15	0.1783	3.98	0.1865	3.86	0.0599	0.12	0.2537	1.24
Age 40-49	0.1485	3.24	0.1447	3.16	0.1590	3.21	0.0186	0.04	0.1885	0.95
Age 50-59	0.0925	2.10	0.0921	2.09	0.1129	2.32	-0.1011	-0.20	0.1619	0.83
University	0.1909	7.03	0.1880	6.92	0.1988	6.17	0.2678	2.99	0.1214	1.74
Diploma or trade certificate	0.0811	4.87	0.0791	4.72	0.1002	5.10	-0.0334	-0.06	0.0700	1.39
Secondary	0.0413	2.01	0.0369	1.77	0.0726	2.69	0.0298	0.44	-0.0365	-0.75
Professionals, managers and administrators	0.2785	11.82	0.2839	12.06	0.2816	10.03	0.1582	1.93	0.3606	5.57
Para-professionals, trades person	0.2611	10.23	0.2681	10.50	0.2409	7.72	0.3030	3.57	0.3377	5.34
Clerks, salesperson and personnel service workers	0.1245	6.61	0.1297	6.85	0.1400	6.25	0.0367	0.54	0.1215	2.32
Mining, electricity, gas and water	0.2267	2.35	0.2234	2.31	0.1752	1.55	0.5714	1.90	-0.0481	-0.15
Manufacturing	0.1071	2.81	0.0969	2.53	0.0545	1.17	0.4726	3.47	0.1007	0.97
Construction	0.0886	2.08	0.0859	2.00	0.0533	1.04	0.3409	2.14	0.0815	0.58
Wholesale, retail trade, transportation and storage	0.0905	2.65	0.0869	2.53	0.0274	0.68	0.4749	3.73	0.0772	0.72
Communication, finance, property and business services	0.1734	4.84	0.1676	4.66	0.1005	2.40	0.5322	3.90	0.2145	1.92
Public administration, defense and community services	0.1520	4.79	0.1473	4.61	0.0888	2.35	0.4703	3.90	0.1585	1.62
Recreation, personal and other services	0.1180	3.37	0.1129	3.21	0.0616	1.48	0.3208	2.34	0.1955	1.95
VIC	-0.0062	-0.34	-0.0051	-0.28	-0.0042	-0.19	0.0285	0.50	-0.0323	-0.81
QLD	-0.0730	-3.77	-0.0683	-3.52	-0.7164	-3.11	-0.1139	-1.73	-0.0246	-0.39
SA	-0.0349	-1.56	-0.0296	-1.33	-0.0531	-1.99	0.0123	0.19	0.0308	0.47

WA	-0.0697	-3.39	-0.0653	-3.16	-0.0963	-3.79	-0.0644	-1.08	0.0164	0.32
TAS,ACT & NT	-0.0306	-1.36	-0.0269	-1.20	-0.0290	-1.10	-0.0109	-0.15	-0.0399	-0.61
Capital city	0.0942	6.84	0.0913	6.62	0.0939	5.80	0.0724	1.40	0.0838	1.72
Cross-ethnic marriage	0.0394	2.46	0.0471	2.90	0.0545	2.57	0.0123	0.27	0.0223	0.61
ESB	0.0108	0.55								
NESB	-0.0678	-3.11								
Arrived before 1995			-0.0930	-2.48						
Arrived 1955-64			-0.0403	-1.30			0.1403	1.62	-0.0251	-0.48
Arrived 1965-74			-0.0095	-0.44			0.1509	1.86	0.0002	0.01
Arrived 1975-84			0.0019	0.06			0.1643	1.75	0.0077	0.12
Arrived 1985-90			-0.0574	-1.44			0.1021	0.92	-0.0408	-0.51
σ_3	0.3678	152.40	0.3679	152.13	0.3756	128.48	0.3567	36.05	0.3085	34.51
$\rho(1,3)$	0.0548	0.93	0.0482	0.83	0.0382	0.59	0.1330	0.55	0.1006	0.52
Log-Likelihood.	-5466.4		-5451.1		-3862.9		-715.15		-773.92	
Sample size	7243		7243		2708		513		506	

Note: $\rho(1,3)$ = Correlation between disturbance in the selection criterion and disturbance in the wage equation; σ_3 =standard deviation of the disturbance of the log of hourly wage equation.

Footnotes

¹See Wooden *et al* (1994) for a comprehensive survey of the literature. For recent literature see Cobb-Clark and Connolly (1996), Will (1996), Shamsuddin (1997), Shamsuddin and Nahid (1998).

²Spouses are not subject to the point test under the concessional family and independent class immigration. A previous study (Webster, 1993) indicates that spouses are less likely to be employed than principal applicants.

³The increased participation of females in market activity has been an important source of labour force growth in Australia since the late 1960s. The labour force participation rate for females increased from 46 percent in 1972 to 61 per cent in 1993, while the participation rate for males decreased from 90 to less than 85 percent over the same period (Kenyon and Wooden, 1994).

⁴In the Canadian context, however, Shamsuddin (1998) found that the double negative effect on female earnings primarily arises from gender discrimination rather than discrimination by birth place.

⁵Under the present immigration policy the government has more control over the volume of immigration than the composition of the immigrant intake because demand for skilled migrants (under the 'independent class') creates an automatic demand for semi-skilled or unskilled immigrants (family members of principal applicants).

⁶This is the type II Tobit model as described in Amemiya (1984). For an application of this model in the context of immigrant earnings, see Shamsuddin (1998).

⁷The latter is a categorical variable, and the mid-value of each category has been taken to approximate hours worked per week. The 1990 Income Distribution Survey provides a fine breakdown for hours worked in a week.

⁸It is well known that immigrant men receive excess returns to post-migration labour market experience in Australia (see Beggs and Chapman, 1988; Chapman and Iredale, 1990; Chapman and Salvage, 1994; and Will, 1996). In the case of women, the present study shows that entry wages of immigrants are not significantly different from that of their native-born counterparts. However, the excess returns to post-migration experience is zero for NESB immigrant women and very low for ESB immigrant women. The results for the wage equation are presented in the Appendix.

⁹To avoid perfect collinearity problems, dummy variables for both arrival periods and English-speaking backgrounds were not included in the same equation. This problem arises from the fact that Australian-born is the reference category in both cases.

¹⁰A likelihood-ratio test provides unambiguous support for this claim.

¹¹To avoid a perfect collinearity problem, dummy variables for both arrival periods and English-speaking backgrounds were not included in the same equation. This problem arises from the fact that Australian-born is the reference category in both cases.

¹²See Killingsworth and Heckman (1986) for details.

¹³It is worth mentioning that government benefits may also affect household savings through their impact on labour supply and retirement decisions. Shamsuddin (1997) observed that immigrants receive more government benefits and save less than Australian-born persons with comparable demographic characteristics. In the context of Canada, Shamsuddin and DeVoretz (1998) found that old age public pensions displaced savings of both the Canadian-born and the immigrant household.

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