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Abstract

The paper examines the labour market participation and earnings of immigrants with particular attention to married women. Using a sample of 8,887 married couples the study observes that, contrary to the popular notion, foreign-born women have higher labour market participation rates than their Canadian counterparts. Immigrant men have lower participation rates than native-born men despite the fact that a vast majority of family heads are men and they are selected as immigrants because of their labour market skills. The probit results are supportive to the findings in the raw data. Foreign-born women assimilate within two years of settlement in Canada while foreign-born men need twelve years to catch up the labour market participation probability of Canadian-born men. The education level increases the labour market participation probability of all demographic groups, however, the effect is least pronounced for foreign-born women. With respect to earnings the study observes a higher rate of assimilation for immigrant women than immigrant men. A typical married woman catches up the mean earnings of a typical Canadian-born married woman within twelve years of settlement in Canada. The study observes that after controlling for earnings differential by gender, foreign-born married women assimilate at a faster rate than foreign-born married men.

I. Introduction

This study examines the labour market performance of immigrants in Canada by gender. Previous studies in the field of economics of immigration primarily focused on the labour market performance of male immigrants.[1] In the last decade, Canada experienced an influx of immigrants under the family reunification class and a sharp increase in immigration from countries with lower female participation in market activity. Hence, it is important to investigate whether the labour market participation rates and earnings of the recent cohort of men (women) immigrants assimilate to their Canadian counterparts. The study uses 1984 Survey of Consumer Finances which includes a large number of immigrant women with non-European background. The empirical work is based on a sample of married couples due to the limited focus of previous literature on this demographic group. The study provides estimates of both gender and birth status-specific probit model for labour market participation and earnings equation. The organisation of the paper is the following. Section 2 provides a literature review. The econometric model is presented in section 3. Section 4 discusses the empirical results. The final section presents the public policy implications of the study.

II. Literature Review

Several Canadian studies exist to explain the earnings performance of immigrants and the native born. From the early study of Tandon (1977) until the recent study of Baker and Benjamin (1993), all Canadian empirical studies basically used Mincer's (1974) human capital earnings model.[2] The basic findings of some representative studies are summarised in this section.

Tandon (1977) used data on adult males from the 1971 census to estimate annual earnings equations. The study suggests that the rate of return on Canada-specific experience was higher than on the human capital acquired abroad. Tandon also found that given any human capital endowment, the earnings of immigrants from Western Europe (except UK.), Southern Europe, Asia, Latin America and the Caribbean lag behind the earnings of the native born and immigrants from the US and the UK.

With respect to immigrant earning assimilation in Canada, one of the widely cited studies is Chiswick and Miller (1988). They used 1971 and 1981 Canadian census data to investigate the determinants of male earnings by birth status. They observed that a typical newly arrived immigrant earned twenty-five percent less than

a comparable Canadian born person. On the average, immigrants reach the earnings of the Canadian born within 22 years of residence in Canada.[3] Similar to Tandon's study, they also found that post-immigration experience had a greater effect on earnings than pre-immigration experience.

Borjas (1988) is critical of studies based on a single cross section. Previous studies estimated the rate of assimilation from the effect of the 'years of residence in the host country' (YRES) on earnings. Borjas claimed that the coefficient of YRES in an earnings equation captured both the assimilation effect and the cohort effect. The latter effect refers to the mean differences in unobserved characteristics across successive entry cohorts. To isolate the cohort effect from the assimilation effect, Borjas pooled 1971 and 1981 census data and estimated earnings equations for three major immigrant demanding countries: Australia, Canada and U.S.A. The results suggest that the assimilation process is slower than that indicated by the cross-sectional studies because of the secular decline in the quality of immigrants over time. However, Borjas' study ignored the effects of wage inflation and productivity growth on earnings over the period 1971-81.

Desilva (1992) investigated whether there exists earnings discrimination between the foreign born and the native born in Canada. The study found no general tendency of discrimination against the foreign born. However, it observed a systematic earnings discrimination by sex.

Beach and Worswick (1993) examined the combined impact of gender and birth place on earnings. The study used 1973 Job Mobility data to estimate earnings equations for native-and foreign-born women. The empirical results suggest that the null hypothesis of no double-negative effect on earnings of immigrant women can not be rejected for the population as a whole. However, there exists a significant double negative effect on the earnings of highly educated immigrant women.

Beach and Worswick (1993) makes an important contribution in understanding the labour market performance of immigrant women. However, the policy implications derived from this study should be interpreted with cautions. First, the study is based on the 1972 cohort of foreign-born women in Canada. The historical data show a significant change in the composition of immigrants since 1972. In particular, immigrants originating from countries with low labour markets participation of women had increased significantly in last two decades due to changes in Canadian immigration policy. Their findings may not be applicable to the post-1972 cohort of immigrant women. Furthermore, they used a sample of women with positive earnings. This is a self-selected sample of women because earnings data are observable only for immigrant women whose reservation wages are less than market wages. The double negative effect is underestimated by not estimating the earnings equations corrected for labour market participation probability. It is important to

recognise that, the phenomenon of double negative effect itself determines the labour market participation decision. Hence, the double-negative effect on the earnings of immigrant women can not be precisely determined by omitting women with zero earnings.

Baker and Benjamin (1993) evaluated the labour market performance of immigrants in Canada. They used data from three Canadian Censuses (1971, 1981 and 1986) and analysed earnings growth of immigrant cohorts by applying the 'quasi-panel' technique of Borjas (1985). They concluded that the rate of immigrant earnings assimilation is very small or even negative. The conclusion is drawn form a sample of males of working age (16 to 64 years) with positive earnings and 40 weeks of labour market experience. It is important to note that if the sample is selected based on a criterion which is closely related to the dependent variable, the resulting empirical analysis may be contaminated by sample-selection bias. The previous empirical literature (e.g., Akbari 1987) suggest that annual earnings is highly correlated with the number of weeks worked. Hence, the number of weeks variable cannot be used as a sample selection criterion on empirical ground.

Previous studies ignored the self-selectivity bias arises in an earning equation from labour force participation choices. The observed earnings distribution is generated by individuals who had a choice to enter or leave the labour force. That is, the observed earnings data are not a random variable. Indeed earnings are an outcome of the individual's self-selection process. Therefore, the ordinary least squares estimates of an earnings equation based on observed earnings will produce biased estimates of the regression coefficients (Maddala, 1986: ch. 9). This type of selectivity bias is crucial when addressing a wide range of issues on immigration. To overcome the self-selectivity bias an appropriate model of labour market participation and earnings is presented in the next section.

III. A Model of Labor Market Participation and Earnings

The Theoretical Background

Human capital theory Can be used to explain life-cycle earnings profiles by birth status. A vast majority of adult immigrants enter Canada after the completion of their formal education.[4] Nevertheless, they need to invest a large proportion of their human capital to accumulate further human capital which is *specific* to the Canadian labour market. Thus it would be expected that an immigrant's earnings profile would remain below the profile of a Canadian born person at the early stage of the post migration life cycle. The high rate of country-specific human capital investment raises future earnings. Therefore, it is conceivable that after some time immigrant earnings

profiles may converge or even surpass the earnings profiles of the Canadian born. This is obviously an empirical issue which will be examined in the next section.

Another possible explanation of the earnings differential by birth place can be found in the screening hypothesis which states that earnings may depend on characteristics which are unrelated to productivity. Education may have little or no role in enhancing the productivity of workers (Spence, 1973). Nonetheless, firms view degrees and diplomas as signals of superior abilities and productivity. In a world of limited information, educational attainment serves as a low cost screen from the employer's perspective. The screening hypothesis can be generalised to include other convenient screening devices such as place of birth, sex, and race. If employers believe that immigrants have a smaller endowment of human capital specific to the Canadian labour market and therefore are less productive on the average then birth status may serve as a low-cost screening device. Consequently, immigrants whose productivity characteristics are above the average will be subjected to statistical discrimination. Thus, the screening hypothesis suggests that the earnings determination process for an immigrant may differ from that of a Canadian born person. Hence, earnings equations should be estimated by birth place.

The Empirical Model

The labour supply literature suggests that individuals' participation involves a comparison between their market wage and their reservation wage (Killingworth and Heckman, 1986). The reservation wage is the level of earnings at which the utility-maximising amount of labour supply reduces to zero. Individuals compare the market value of their productivity characteristics with the benefits they would obtain from non participation in the labour market. The former is their market wage and the latter is their reservation wage. The following pair of equations determines market and reservation earnings:

$$(1) \quad \ln Y_m = \mathbf{X}_1\beta + u_1$$

$$(2) \quad \ln Y_R = \mathbf{X}_2\alpha + u_2$$

where Y_m and Y_R denote market earnings and reservation earnings respectively. The structural component ($\mathbf{X}_1\beta$) of equation (1) represents the expected log of earnings if the individual participates in the labour market. Similarly, the term $\mathbf{X}_2\alpha$ indicates the expected log of benefits inclusive of the value of both pecuniary and non pecuniary benefits, if the individual chooses not to work. The vector of observable variables $\mathbf{X}_1$ includes at least one variable which is not included in $\mathbf{X}_2$.[5] The error terms u_1 and u_2 capture the effects of unobserved characteristics such as motivation, ethnic capital,

ability on earnings and the measurement errors in earnings.[6] The net benefit from labour force participation can be expressed as:

$$(3) \qquad B^* = \mathbf{X}_1\beta - \mathbf{X}_2\alpha + (u_2 - u_1)$$

The net benefit, B^* is not observable since the reservation earning is unobservable. An individual either participates in the labour market (if $B^* > 0$) or does not (if $B^* < 0$). The participation probability is approximated by a linear probit model that has the following deterministic component:

$$(4) \qquad \text{Prob}\,(\mathbf{X}_1\beta - \mathbf{X}_2\alpha)$$

If the self-selection criterion is ignored and the earnings equation (1) is estimated by the OLS using the units with positive earnings, the resulting estimates will be biased. Because the conditional expectation of u_1 is no longer zero due to self-selectivity bias (Maddala, 1986, p. 224). The market earnings for individual i, adjusted for the participation choice, can be expressed as:

$$(5) \qquad \ln Y_{mi} = \mathbf{X}_{1i}\beta - \sigma_{1u}\lambda_{1i} + V_{1i}$$

where, λ_{1i} is the Inverse Mill's Ratio (IMR), $\sigma_{1u} = \text{cov}\,(u_1, u_2)$ and V_{1i} is a heteroscedastic error term that is distributed with zero mean. If equation (5) is estimated by running OLS of $\ln Y_m$ on $\mathbf{X}_1$ the resulting estimators will be inconsistent and inefficient.[7] Following Heckman's (1976) two-stage estimation procedure first, the IMR is computed from the probit model of labour force participation. At the second stage the earning equation (5) is estimated using the fitted IMR as one of the regressors.

IV. Empirical Analysis

The Data

The empirical analysis is based on microdata contained in the Public Use Sample Tape entitled *Income (1983), Assets and Debts (1984) of Economic Families and Unattached Individuals.* This tape contains 14,029 observations on the economic and demographic characteristics of households. A sample of 8877 married couples is used for empirical work. Three types of families are excluded from the analysis: (i) special family units, (ii) unattached individuals and (iii) other families.[8]

The labour market performance of immigrants is examined at two different levels. First, it is assumed that human capital and other personal characteristics affect identically the earnings of both the Canadian born and the foreign born. Based on this assumption a single earnings equation is estimated for all male or female workers irrespective of birth status. To analyse the labour market assimilation rate of immigrants a set of dummy variables representing six distinct periods of arrival in Canada is included in the probit and earning equations. Second, the above assumption is relaxed and birth status-specific probit and earning equations are estimated.

Empirical Issues

To capture the arguments of human capital theory an augmented version of Mincer's (1974) earnings model is employed. Mincer's model presumes that earnings are a function of the number of years of schooling, the number of years of post schooling experience in the labour market, experience squared (to capture diminishing returns to experience) and the number of weeks worked - a proxy for labour supply. The cross-sectional data set used in this study does not provide the work histories of individuals. Consequently, age is used as a proxy for the experience variable. Different levels of educational attainment are represented by a set of dummy variables.

A large number of immigrants originated from countries with schooling and labour market systems very different from those born in Canada, Chiswick and Miller (1988) used a years-of-residence (YRES) variable to measure the post immigration labour market experience. Due to lack of data, the present study uses a set of dummy variables representing different arrival periods as a proxy for post immigration experience.

The earnings equation refers to potential rather than actual earnings (Blinder, 1976). Actual earnings of an individual may deviate from his or her potential earnings as noted earlier because of the individual's choice with respect to his/her labour supply. For example:

(i) Individuals may not work at all if reservation earnings exceed their market earnings;
(ii) Individuals may work full time but part of the year;
(iii) Individuals may work part time rather than full-time.

The self-selectivity bias which arises from the first aspect of labour supply has been explicitly taken into account in the general form of our earnings model presented in the last section. The second and third aspects of labour supply behaviour is accounted

for by including two control variables in the earnings function. These are the 'log of the number of weeks worked' and a 'dummy variable for full-time work'.[9]

To this point the qualitative dimension of education and experience is ignored. The human capital stock can not be accurately measured by only considering the years of schooling and years of labour market experience. A student of economics may spend the same number of years at a university as that of a physician. However, the market rate of return of the university degree may not be the same for both individuals. Similarly, the market rate of return on experience as a business executive will differ from that as an agricultural worker. The occupational structure in the labour market has evolved in such a way that in most cases a specific occupation is related to a specific kind of formal schooling. Academic institutions and professional associations often use aptitude tests to exclude persons from certain types of occupations (e.g., doctors, accountants and lawyers). Therefore individuals will tend to work in different occupations according to their abilities. To capture the effects of differential abilities and the specificity of occupational experience a set of occupational dummy variables in the earnings equation is included.[10]

A set of locational dummies representing the place of residence in Canada is also included in the earning equation. The previous literature also documented a systematic earnings differential by gender. In case of Canada, Kuch and Haessel (1979) and Miller (1987) report that in general male workers obtain an earning advantage over females due to a greater endowment of human capital as well as the existence of earnings discrimination by sex. Hence, earnings equations are estimated by birthplace and gender. This will allow us to compare earnings of male native-born workers with those of male foreign-born workers as well as the earnings of female native-born workers with those of female foreign-born workers.

Empirical Results

The probit model is estimated for the full sample while the earning equation is estimated using a sample of individuals with positive earnings. The empirical results for the restricted probit and the earnings equations are presented in Table 1 and Table 2 respectively. First, the results on labour market participation are to be interpreted. The individual's likelihood of labour market participation increases with age in the early stage of the life cycle but decreases with age after they pass a threshold age. The latter phenomenon captures the fact that greater compensation is required to induce a middle-aged person than a younger person to participate in the labour market.

The estimated coefficients for the educational attainment dummy variables indicate a significant increase in the probability of labour market participation with higher education levels. Note that the omitted category here is "less than or equal to

eight years of schooling." The positive impact of education on labour market participation is more pronounced for the potential female worker than for their male counterparts. The presence of children under age seven significantly reduces the likelihood of female participation. The participation decision of potential male workers, however, is statistically insensitive to the presence of young children. The coefficient for the non labour income variable obtains a theoretically expected negative sign in the male equation but a positive sign in the female equation. An increase in non labour income raises the reservation wage of an individual and hence reduces the likelihood of labour market participation. The positive impact of non labour income on the probability of female participation either reflects that leisure is an inferior good for females or higher non labour income opens up new market opportunities for women.[11] The coefficients for regional dummies and urbanisation are self-explanatory. With respect to immigration dummies,[12] it is observed that a typical newly arrived male immigrant catches up to the labour market participation probability of the typical Canadian male within twelve years of residence in Canada. Foreign born females, however, require only two years from the date of arrival to catch up and pass the labour market participation probability of Canadian born females. This indicates a lower reservation wage for the foreign born females as compared to Canadian born females, ceteris paribus.

(INSERT TABLE 1)

Table 2 report the estimated earnings equations. The coefficients of age and age squared suggest that the earnings profile for a typical male reaches its peak at age 47.6 years while females obtain their peak earnings at age 49.4 years. Educational attainment, log of the number of weeks worked and dummy variables for full time work and urbanisation - all have significant positive effects on earnings. The catching up point for earnings occurs for a typical male immigrant after seventeen years and for female immigrants the corresponding figure is twelve years. It should be pointed out that the assimilation effects are statistically insignificant for female workers as indicated by t-statistics of the coefficients of dummy variables for the period of arrival. The coefficients of the Inverse Mill's Ratio are found insignificant in both equations.

(INSERT TABLE 2)

The Labor Market Performance of Immigrants vis-à-vis Canadian born

So far an analysis of immigrants' labour market assimilation is conducted. However, the hypothesis of an identical earnings generation process for the Canadian born and the foreign born is in fact rejected by the F-test. Hence the probit and earnings equations. The empirical results for the probit and earning equation by the place of birth are reported in Table 3 and Table 4 respectively. The main findings with respect to labour market participation are the following.

The likelihood of labour market participation responds in the same way with respect to the stage of life cycle for both the foreign-born and Canadian-born males. Foreign born females experience that their net gains from participation (market wage - reservation wage) increase with respect to age until age 30 and then decrease. On the other hand, the net gain from participation for Canadian-born females begins to decline at the beginning of their working life (age 21). This may be due to the differential reservation wage by birth place. Educational attainment increases the likelihood of labour market participation, but the effect is more pronounced for Canadian-born females than for their foreign-born counterparts. The dummy variables for 'university education' and 'some post-secondary education' obtain coefficients of similar magnitude in both Canadian-born and foreign-born probit equations. The probability of participation for a foreign born person with secondary school education (at least nine years of schooling) is not significantly different from a secondary school dropout (the omitted category). In the case of a Canadian born person, however, schooling (at least nine years) does make a significant difference. The remaining coefficients can be interpreted in a fashion similar to our previous explanation for the restricted probit model.

(INSERT TABLES 3, 4 AND 5)

Estimated earning equations corrected for labour market participation are presented in Table 4. For the given vector of observed characteristics, the age-earnings profiles reach a maximum at age 48 for a Canadian-born male, age 45 for a foreign born male, age 50 for a Canadian born female and age 46 for a foreign-born female. Although the coefficients for age differ by birth status (signifying a differential rate of return to post-schooling experience) the coefficient of age squared does not vary with the place of birth. This finding implies that the rate of depreciation of human capital is the same for both the Canadian born-male (female) and foreign born-male (female).[13]

The results on educational attainment are also consistent with human capital theory. The benchmark for comparison is the omitted education level, i.e., 'less than grade nine education.' The gross return for the jth education level compared to the omitted education level is computed using the following procedure. The percentage change in earnings is computed with respect to the educational level, holding experience, occupation and other characteristics constant. Let $\ln Y_u$ and $\ln Y_s$ stand for the log of earnings with a university degree and less than nine years of schooling, respectively. The expected log of earnings can be expressed as

$$\ln Y_u = \omega Z + C_u$$
$$\ln Y_s = \omega Z$$

where Z contains all the explanatory variables except the educational dummies and ω is the relevant parameter vector, C_u is the coefficient of university education dummy in the earning equation. From the above pair of equations an estimate for the proportional difference in earning between a university graduate and a school dropout, ceteris paribus, can be obtained:

i.e., $$\frac{Y_u - Y_o}{Y_o} = \exp(R_u) - 1$$

Table 5 provides the estimated rates of return for different education levels. A typical Canadian-born male university graduate earns 57.9 percent more than a school dropout belonging to the same group. A male immigrant with a university degree earns only 41 percent more than a male foreign born school drop-out. It is clear from the table that females experience a greater percentage gain in earnings vis-à-vis males. Most noticeably, annual earnings for a female immigrant with a university degree are almost 80% higher that of a female school drop out.

The impacts of occupational dummies on earnings are qualitatively similar regardless of birth status, but not by sex. For all groups, self-employed workers earn less than wage workers. The coefficients for weeks worked and the dummy variable for full time work obtain expected signs with a high degree of statistical significance. With respect to assimilation effects it is observed that the most recent cohort of immigrants (arrived in 1983-84) catches up to the earnings of the pre 1967 cohort of immigrants after seventeen years in Canada for males and after twelve years in Canada for females.[14]

V. Summary and Conclusions

The study evaluates the labour market performance of immigrants by gender. Using a sample of 8,877 married couples the study derives the following key results. Contrary to the general belief the labour market assimilation occurs at a faster rate for married females than that of married males. Married foreign-born women catch up the labour market participation probability and earnings of married Canadian-born women within two and twelve years of settlement in Canada, respectively. The foreign-born men, on the other hand, require twelve and seventeen years of Canadian settlement experience to catch up the labour market participation rate and earnings respectively of their native-born counterparts.[15] Considering the high labour market assimilation rates for immigrant women, the study concludes that Canada's "family class" immigrants are unlikely to pose an additional economic burden on native-born population in general.

Appendix

Variable definitions

ln Y = natural logarithm of annual employment income
AGE = age represented in years

Dummy Variables for Educational Attainment

UNV = university degree
PSEC = some post secondary
SEC = 9 to 13 years of elementary and secondary education.
Omitted category = less than or equal to 8 years of schooling

Control variables for labour supply:

lnWKS = natural logarithm of the number of weeks worked in a year
FUL = a dummy variable for full-time work
SELF = a dummy variable for self-employment

Occupational Dummy Variables:

MAD = managerial, administrative and professional occupations which include natural sciences, engineering, mathematics, social science, religion, teaching, medicine and health, artistic, literacy, recreational and related occupations;
CSR = clerical, sales and services
PCT = product fabricating, assembling and repairing, construction, trades, transportation equipment operation, materials handling, other crafts and equipment operation
Omitted Category = mining and quarrying processing, farming, horticultural and animal husbandry, fishing, hunting, trapping, forestry and logging

Dummy Variables for Family Characteristics and Place of Residence :

CHL6 = presence of children in the family six or less years of age
ATLN = primary residence in Atlantic region
PQ = primary residence in Quebec
PRA = primary residence in prairie provinces
BC = primary residence in British Columbia
Omitted Category = primary residence in Ontario

Dummy Variables for Urban residence:

URBAN = resident of an urban center with a population greater than 30,000

Omitted Category = resident of a rural area or a small urban centre with a population less than or equal to 30,000

NLI = non labour income

The Probit Model

$$\text{Prob (Participation)} = \gamma_0 + \gamma_1 AGE_i + \gamma_2 AGE_i^2 + \gamma_3 UNIV + \gamma_4 PSEC_i + \gamma_5 SEC_i + \gamma_6 CHL6_i + \\ + \gamma_7 NLI_i + \gamma_8 ATLN_i + \gamma_9 PQ_i + \gamma_{10} PRA_i + \gamma_{11} BC_i + \gamma_{12} URBAN_i + u_i$$

The Earning Equation:

$$\ln Y_{mi} = \beta_0 + \beta_1 AGE_i + \beta_2 AGE^2_i + \beta_3 UNV_i + \beta_4 PSEC_i + \beta_5 SEC_i + \beta_6 MAD_i + \\ \beta_7 CSR_i + \beta_8 PCT_i + \beta_9 SELF_i + \beta_{10} \ln WKS_i + \beta_{11} FUL_i + \beta_{12} ATLN_i + \\ \beta_{13} PQ_i + \beta_{14} PRA_i + \beta_{15} BC_i + \beta_{16} URBAN_i - \sigma_{1u} \lambda_{1i} + V_{1i}$$

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Table 1

Probit Model for Labor Market Participation by Sex
Dependent Variable: D = 1 for participation and D = 0 otherwise

Variables	Male Equation	Female Equation
Constant	-0.7983 (-3.09)	0.0154 (0.09)
Age	0.1466 (14.51)	0.0422 (5.52)
Age^2	-0.00196 (-19.65)	-0.00096 (-11.39)
University	0.6289 (7.21)	0.7647 (11.61)
Some Post-Secondary	0.4211 (5.91)	0.5754 (11.62)
Secondary	0.1808 (3.62)	0.3363 (8.25)
Children $\leq$ 6 years	-0.0203 (-0.30)	-0.6511 (-16.35)
Nonlabor income/1000	-0.0505 (-18.86)	0.0149 (3.28)
Atlantic	-0.2563 (-3076)	-0.1271 (-2.62)
Quebec	-0.1252 (-2.07)	-0.1548 (-3.69)
Prairies	0.2274 (3.46)	0.1426 (3.30)
B.C.	-0.1124 (-1.47)	0.0168 (0.31)
Urban Household	-0.0108 (-0.22)	0.1381 (4.17)
IMG46	0.0609 (0.54)	0.0906 (0.90)
IMG66	0.0735 (0.97)	0.1804 (3.40)
IMG71	-0.0665 (-0.44)	0.1869 (1.97)

Table 1: Probit Model for Labor Market Participation by Sex. cont'd

Variables	Male Equation	Female Equation
IMG76	-0.3035 (-2.24)	0.1210 (1.36)
IMG81	-0.2753 (-1.64)	0.3132 (2.65)
IMG84	-1.3755 (-6.65)	-0.3562 (-1.84)
Number of Participants	7314	4989
Number of Non-Participants	1563	3888
Participation Rate (per cent)	82.4	56.2
χ^2 [Degrees of freedom]	3878.0 [18]	2191.2 [18]

Note: The figures in ( ) parentheses are the t-values.

Table 2
Earning Equations for all Workers by Sex
Dependent Variable: log (annual earnings)

Variable	Male Equation	Female Equation
Constant	4.4531 (37.34)	4.7783 (25.53)
Age	0.0714 (13.64)	0.0316 (4.22)
Age^2	-0.00075 (-11.96)	-0.00032 (-3.27)
Dummy variables for educational attainment[1]		
University	0.4318 (14.44)	0.5692 (9.07)
Some post secondary	0.2419 (9.66)	0.3511 (6.71)
Secondary	0.1337 (6.59)	0.2139 (5.02)
Occupational dummy variables[2]		
Managerial, administrative and professional	0.1140 (4.45)	0.0372 (0.70)
Clerical sales and services	-0.0945 (-4.00)	-0.2542 (-5.33)
Transportation, construction, product fabricating, etc.	0.0403 (1.88)	-0.2612 (-4.29)
Control variables for labour supply[3]		
Self-employed	-0.3980 (-16.57)	-0.5392 (-9.28)
Ln (weeks worked)	0.8575 (61.27)	0.7929 (55.63)
Full-time	0.4773 (12.74)	0.6740 (25.77)
Regional dummy variables[4]		
Atlantic	-0.1742 (-7.21)	-0.0776 (-1.96)
Quebec	-0.811 (-4.00)	0.0429 (1.28)
Prairies	-0.0227 (-1.10)	0.0784 (2.39)
B.C.	-0.0977 (-4.00)	0.1368 (3.28)
Urban household[5]	0.0930 (5.56)	0.1645 (5.93)
Dummy variables for immigrant arrival[6]		
IMG46	-0.0157 (-0.25)	0.1183 (1.16)
IMG71	-0.1657 (-3.83)	0.0978 (1.47)
IMG76	-0.1748 (-4.17)	-0.0790 (-1.22)
IMG81	-0.3168 (-5.90)	-0.2019 (-0.98)
IMG84	-0.5760 (-5.23)	-0.2019 (-1.25)

Table 2 (concluded)

Variable	Male Equation	Female Equation
IMR	-0.0198 (-0.83)	-0.0941 (-1.10)
$\bar{R}^2$	0.548	0.575
F-statistic (degrees of freedom)	386.1 (23,7290)	294 (23,4965)
Standard error corrected for selection	0.6014	0.8006

NOTES:
1. Omitted category: Less than or equal to 8 years of schooling.
2. Omitted category: Mining and quarrying processing, farming, horticultural and animal husbandry, fishing, hunting, trapping, forestry and logging.
3. Control Variables for labour supply includes two dummies: a dummy variable for full-time work and a dummy variable for self-employment.
4. Omitted category: Primary residence in Ontario.
5. A dummy variable for urban residence. The omitted category includes residents of a rural area or a urban centre with a population less than or equal to 30,000.
6. Omitted category: Canadian-born male/female.

Table 3
Probit Model for Labor Market Participation
by Birth Place and Sex

Dependent Variable: D = 1 for participation and D = 0 otherwise.

Variables	Male Canadian born	Male Foreign born	Female Canadian born	Female Foreign born
Constant	-0.8951	-0.4721	-0.0394	-0.5756
	(-3.18)	(-0.67)	(0.20)	(-1.17)
Age	0.1460	0.1543	0.0285	0.0710
	(13.14)	(5.91)	(4.59)	(3.57)
Age^2	-0.0020	-0.0021	0.0009	-0.0012
	(-17.64)	(8.38)	(-9.89)	(-5.86)
University	0.6607	0.5751	0.8731	0.4872
	(6.40)	(3.36)	(11.47)	(3.59)
Some post-sec.	0.4281	0.4218	0.6713	0.2788
	(5.21)	(2.84)	(11.78)	(2.67)
Secondary	0.2059	0.0913	0.3976	0.2106
	(3.71)	(0.78)	(8.38)	(2.55)
Children ≤ 6 years	0.0362	-0.2643	-0.6483	-0.6651
	(0.48)	(-1.76)	(-14.84)	(-6.79)
Non-labour income/1000	-0.0470	-0.0688	0.0156	0.0108
	(-16.06)	(-10.02)	(3.03)	(1.09)
Atlantic	-0.1956	-0.4622	-0.1172	-0;11054
	(-2.70)	(-1.61)	(-2.27)	(-0.50)
Quebec	-0.0598	-0.3171	-0.1542	-0.0504
	(-0.89)	(-2.19)	(-3.30)	(-0.48)
Prarie	0.3186	-0.0287	0.1700	-0.0428
	(4.22)	(-0.21)	(3.47)	(0.46)
B.C.	-0.0512	-0.0246	0.0190	0.0331
	(0.56)	(-1.76)	(0.30)	(0.33)
Urban Household	-0.0098	-0.0027	0.1152	0.0263
	(-0.19)	(-0.02)	(3.25)	(2.75)
IMG66		-0.1073		0.0607
		(-0.70)		(0.50)
IMG71		-0.2329		0.1280
		(-1.07)		(0.83)
IMG76		-0.4235		0.0916
		(-1.98)		(0.60)
IMG81		-0.3594		0.2916
		(-1.53)		(1.71)

Table 3: Probit Model for Labor Market Participation by Birth Place and Sex

cont'd

Variables	Male Canadian born	Male Foreign born	Female Canadian born	Female Foreign born
IMG84		-1.5414 (-5.63)		-0.3563 (-1.56)
Number of participants	5952	1362	3995	994
Number of non participants	1207	356	3164	724
Participation Rate (per cent)	83	79	56	58
χ^2	2995.8	889.7	1793	424.5
(Degrees of freedom)	(12)	(17)	(12)	(17)

Table 4
Earnings equations by birth place and sex
Dependent variable: Ln (annual earning)

Variable	Male Canadian born	Male Foreign born	Female Canadian born	Female Foreign born
Constant	4.4395 (33.24)	4.5365 (15.60)	4.7037 (22.64)	5.5481 (11.06)
Age	0.0722 (12.25)	0.0631 (5.11)	0.0298 (3.50)	0.0281 (1.47)
Age^2	-0.00075 (-10.44)	-0.0007 (-5.16)	-0.0003 (-2.66)	-0.0003 (-1.35)
Dummy variables for educational attainment[1]				
University	0.4568 (13.19)	0.3429 (5.82)	0.5616 (7.30)	0.5861 (5.41)
Some post-secondary	0.2662 (9.20)	0.1519 (3.07)	0.3674 (5.67)	0.2915 (3.36)
Secondary	0.1433 (6.16)	0.0893 (2.13)	0.2169 (4.07)	0.1971 (2.81)
Occupational dummy variables[2]				
Managerial administrative, and professional	0.0979 (3.41)	0.1728 (3.10)	0.0234 (0.39)	0.1121 (0.97)
Clerical, sales and services	-0.9804 (-3.01)	-0.1515 (-3.03)	-0.2719 (-5.06)	-0.1742 (-1.71)
Transportation, construction, product fabrication etc.	0.0398 (1.65)	0.0273 (0.58)	-0.2633 (-3.57)	-0.1956 (-1.71)
Control variables for labour supply[3]				
Self-employed	-0.4095 (-15.21)	-0.3412 (-6.44)	-0.5725 (-8.67)	-0.4271 (-3.56)
Ln (weeks worked)	0.8494 (54.40)	0.8921 (29.45)	0.8126 (50.87)	0.7002 (23.34)
Full-time	0.4690 (11.46)	0.5476 (6.03)	0.6860 (23.25)	0.6368 (11.39)
Regional dummy variables[4]				
Atlantic	-0.1637 (-6.31)	-0.0823 (-0.81)	-0.0779 (-1.82)	0.0930 (0.63)
Quebec	-0.0587 (-2.59)	-0.1866 (-3.82)	0.0499 (1.31)	0.0104 (0.14)
Prairie	0.0372 (1.57)	-0.0206 (-0.48)	0.0890 (2.35)	0.0284 (0.43)
B.C.	0.0372 (4.09)	0.0335 (0.71)	0.1646 (3.27)	0.0678 (0.93)
Urban household[5]	0.787 (4.86)	0.1240 (2.67)	0.1762 (5.95)	0.0719 (0.87)

TABLE A2 (concluded)

Variable	Male Canadian born	Male Foreign born	Female Canadian born	Female Foreign born
Dummy variables for immigrant arrival[6]				
IMG66		0.01186 (0.18)		-0.1038 (-0.98)
IMG71		-0.1373 (-1.74)		-0.0944 (-0.77)
IMG76		-0.1608 (-2.02)		-0.2768 (-2.24)
IMG81		-0.3117 (-3.63)		-0.2673 (-2.30)
IMG84		-0.6716 (-5.29)		-0.4181 (-2.27)
IMR	-0.1909 (-1.94)	0.2413 (2.65)	-0.0659 (-0.69)	-0.1837 (-0.95)
$\bar{R}^2$	0.547	0.561	0.584	0.525
F-statistic (degrees of freedom)	423.3 (17,5934)	80.0 (22,1339)	330.7 (17,3977)	50.8 (22,971)
Standard error corrected for selection	0.6114	0.5654	0.8119	0.7456

NOTES:
1. Omitted category: Less than or equal to 8 years of schooling.
2. Omitted category: Mining and quarrying processing, farming, horticultural and animal husbandry, fishing, hunting, trapping, forestry and logging.
3. Control Variables for labour supply includes two dummies: a dummy variable for full-time work and a dummy variable for self-employment.
4. Omitted category: Primary residence in Ontario.
5. A dummy variable for urban residence. The omitted category includes residents of a rural area or a urban center with population less than or equal to 30,000.
6. Omitted category: Immigrants who arrived in Canada before 1946.

Table 5 Gross Return on Education by Sex and Place of Birth (in percentage)

Educational Attainment*	Male Canadian Born	Male Foreign Born	Female Canadian Born	Female Foreign Born
University Degrees	57.9	40.9	75.3	79.7
Some Post Secondary Education (diploma, training certificates)	30.5	16.4	44.4	33.8
Secondary Education (greater than or equal to 9 years of schooling)	15.4	9.3	24.2	21.8

Source: Table 4.2(b)
* The reference group is 'less than grade 9 education.'

Footnotes

[1]Exceptions to this include some recent Canadian studies such as Beach and Worswick (1993) and Fagnan and DeVoretz (1994). Beach and Worswick used 1973 Job Mobility Survey data while Fagnan and DeVoretz employed 1971 and 1986 Census data to evaluate the earnings performance of female immigrants in Canada.

[2]An alternative to human capital theory is the *screening hypothesis* developed by Arrow (1973) and Spence (1973). Earnings differential by the place of birth or sex may arise due to a differential endowments of human capital or due to attributes unrelated to productivity. Human capital theory explains the former while the screening hypothesis explains the later.

[3]Beujot and Rappak (1988) found that immigrant groups who arrived from Southeast Asia, Southern Europe, Oceania, the Caribbean, South and Central America, and West and East Asia were not able to reach the earnings of Canadian-born individuals even after 20 years of residence in Canada. The recent vintage of immigrants (who arrived in the 1980s) faced adjustment difficulties in the labor market due to a lack of proficiency in English and poor educational attainment. Meng (1987) found a 'catch up period' of only 14 years using the 1973 labor mobility survey of Statistics Canada.

[4]The median age of immigrants at entry was 26.7 years in 1985 (Foot, 1986).

[5]An alternative identification condition for this model is $cov(u_1,u_2)= 0$.

[6]It is assumed that $(\ln Y_m, \ln Y_R)$ have a joint log-normal distribution.

[7]They will be inconsistent due to the omission of a variable, λ_1 which is not orthogonal to included explanatory variables. The inefficiency arises from the presence of a heteroscedastic error term V_1.

[8]The first category includes 72 extremely wealthy families. To protect the identity of these families, their age and other economic-demographic characteristics have been suppressed in the sample, which prevents us from conducting any empirical analysis of their earnings. A significant proportion of the second and third type of families is headed by elderly women, perhaps widows whose earning profiles are expected to bew structurally different from the married females with husbands present. The families under the title "other families" includes the following types of households - 'brother and sister living in the same dwelling' or 'grandparent living with grandson or granddaughter' in the same house. The head of these families is not necessarily the principal earner. We only have data for the economic-demographic characteristics of heads of households for the "other families" category. Indeed, these families are expected to dissolve through marriage of younger members and the death of its older members (grandparents). Hence, profiles of earnings for the 'male-headed families with wife present' is expected to differ significantly from the 'unattached' and 'other families'. Thus the study is restricted to focus on 8877 couples.

[9]Meng (1987) and Chiswick and Miller (1988) included the 'log of the number weeks worked' as an explanatory variable following the suggestion of Mincer (1974). Desilva (1992) used the log of the average weekly earnings as the dependent variable, which implicitly assumes a unit elasticity of annual earnings with respect to the number of weeks worked.

[10]Another aspect of human capital that is specific to the Canadian labor market is English and French proficiency, which could not be included due to lack of data.

[11]For example, women with higher nonlabor income may be able to afford day care expenses for their children and job training for themselves, which facilitates their market participation.

[12] The dummy variables for the arrival periods are:

IMG46 = immigrated before 1946,
IMG66 = immigrated between 1966 and 1946,
IMG71 = immigrated between 1971 and 1967,
IMG76 = immigrated between 1976 and 1972,
IMG81 = immigrated between 1981 and 1977, and
IMG84 = immigrated between 1984 and 1982.

[13]It may be noted that the finding with respect to human capital depreciation is similar to an earlier study (Akbari, 1988) based on the 1981 Census.

[14]This study could not isolate the cohort effect from the assimilation effect because the previous Survey of Consumer Finances (1977) does not provide a detailed breakdown of immigrants by arrival periods. Hence, the estimates of assimilation effects may partly capture the cohort effect.

[15]The study by Fagnan and DeVoretz (1994) reports that earnings assimilation for males occurs within twelve years and assimilation for females are comparable to that of males. Beach and Worswick (1993), however, observe an initial earnings advantage for married females but no further earnings assimilation. Their study was based on 1973 Job Mobility Survey.

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