Immigrant Earnings Differentials and Cohort Effects in Canada

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I. Introduction

The relationship between immigration flows and the labour market has become very topical in both the United States and Canada in the last couple of years. Major articles in such forums as The New York Times,[1] Science,[2] and the Journal of Economic Literature,[3] the 1986 enactment of the Immigration Reform and Control Act in the United States, and current revision of the Canadian immigration legislation signal an active debate in both countries on how to adjust immigration policy to the situation of the 1980's. This paper, first of all, seeks to examine what has been happening to immigrant earnings in Canada up through the 1970's in light of the U.S. experience.

Both Chiswick (1986b) and Borjas (1985) have found strong evidence of widening immigrant earnings differentials in the United States. A recent debate at the December 1986 American Economic Association meetings revolved around the explanation of the relative decline of immigrant earnings in the U.S. and focused attention on the effect of changing immigration policy and the changing nature of immigrant flows on earnings differentials. The debate has posited two alternative explanations. Borjas (1985) has argued that (i) changed U.S. immigration policy in the sixties widened the range of source countries from which skilled immigrants would be accepted (under occupational preference visas) and brought in a preference system based on kinship relationships and (ii) likely increased illegal immigration to the U.S. resulted in the "quality" of immigrants decreasing over the last two decades. Chiswick (1986b), on the other hand, has pointed out that the advent of baby-boomers entering the labour market and the continued rise of married women's participation rates over the same period have widened skill differentials and steepened age-earnings profiles for the economy as a whole. To the extent that immigrants are typically young workers and lack extensive experience in the U.S. labour market, their relative earnings have slipped along with earnings of less experienced workers in the economy as a whole.[4] This paper seeks to test these two hypotheses in the Canadian context. In this case, a generally similar labour market and pattern of demographic/participation effects, but different immigration policies and different geographical location from the United States, provide an alternative venue for evaluating both cohort-related hypotheses.

The paper makes use of a non-Census Canadian micro data set that has only lately come to economists' attention and that contains particularly useful variables for analyzing immigrant earnings experiences. Canadian data are interesting, not only in their own right, but also because of the much higher proportion of immigrants in the population than in the U.S. -- 22% vs. 5%[5] among adult males -- so that more clear-cut empirical results are more readily obtained from large micro data sets. The data set used here comes from a special survey, the July 1973 Job Mobility Survey, designed by Statistics Canada to collect extensive information on family background that is unique for Canada. It has detailed information on

[1] For example, Chiswick (1986a).
[2] Borjas and Tienda (1987).
[3] Greenwood and McDowell (1986). See also, for example, Abowd and Freeman (1987).
[4] Clearly, these hypotheses are not mutually exclusive. But they have potentially different implications for the directions of immigration policy and for the long-run relative economic well-being of immigrants. In the case of the decreasing-immigrant-quality hypothesis, the expected relative earnings experiences of typical immigrant workers is much less rosy than previously believed.
[5] Canadian figure is from Chiswick and Miller (1986 from the 1971 Census; the U.S. figure is from Chiswick (1978) from the 1970 Census.

respondents' immigrant status, time of arrival, and country of origin. It also has, unique for Canada, a direct measure of actual reported work experience. Thus one need not generate a work experience variable (through the standard Mincer identity) from age and education; instead, one can use age - distinct from work experience - as an indicator of vintage or cohort effects. This is the only Canadian data set to the author's knowledge which allows this, and this is the basis of our analysis of immigrant earnings effects. By design, the survey also collects extensive information on family background and other controls. For example, it contains unusually rich detail on workers' language skills -- of key interest in Canadian labour markets and recent literature[6] -- as well as education and work experience of mother and father separately. It also has better controls for the previous year's labour market activity (such as usual hours worked per week last year) than normally reported. A further objective of the paper, then, is to evaluate foreign-born earnings differentials controlling for a more extensive set of parental family background characteristics and labour market variables than normally available.

Typically, immigrant earnings studies make use of decennial Census data; e.g., Tandon (1978), Chiswick and Miller (1984 and 1986), and Chiswick (1987). But these data contain relatively few controls for labour market activity, limited language variables, and no parental background information. These analyses also all involve single cross-section regressions; and lacking a direct measure of work experience or use of cohort matches from multiple Censuses, they cannot address the issue of cohort earnings effects. Meng (1986) does look at immigrant earnings with the Job Mobility Survey data, but uses a different estimation sample, adopts a more restrictive specification of the human capital predictors of earnings, does not consider the issue of cohort effects, and makes use of far fewer background variables and other controls. Other non-immigrant studies that have made use of the Job Mobility Survey data are Beach and Finnie (1987) and Meng and Sentance (1984).

The paper is organized as follows. The next section briefly reviews Canadian immigration policy and experience between World War II and the 1970's, and examines changing immigrant characteristics for this period from the Job Mobility Survey data. Some basic earnings regression results are presented in Section III and evaluated with respect to estimated cohort effects, foreign-born interactions, and their implications for testing the two cohort-effect hypotheses of Borjas and Chiswick. The analysis is then extended in Section IV with the addition of detailed language and family background variables to the regressions. Robustness of the major results with respect to statistical selectivity problems inherent in immigrant earnings studies is examined in Section V. For example, if the estimation sample includes only paid workers while immigrants exhibit a greater incidence of self-employment than the native-born, potential sample-selection bias may be imparted to conventional estimates of immigrant earnings effects. The paper adjusts for such bias, to the authors' knowledge, for the first time in the immigrant earnings literature. Finally, an overview of principal findings and concluding remarks appears in Section VI.

[6] See, for example, Chiswick and Miller (1986), McManus et al. (1983), and Robinson (1987).

II. Canadian Post-War Immigration Experience and Immigrant Characteristics

Borjas (1985) and Chiswick (1986b) qualifiedly argue that, for the United States, immigrant quality has been decreasing since the 1950's so that more recent cohorts of immigrants face a lower real earnings trajectory than earlier cohorts. They point to rapidly rising immigration rates (legal and otherwise); a dramatic shift away from "traditional" European immigrant sources of earlier decades to Latin American and Asian sources, immigrants from which are likely to have greater difficulty adapting to North American labor markets; a relative decline in education levels of immigrants; and the 1965 Immigration and Nationality Act which (among other things) opened skilled immigration to non-traditional sources such as Asian and shifted priorities from occupational to family preferences as basis for admissions.

i. Canadian Immigration Experience and Policy

Total immigration flow figures for Canada are provided in Table 2.1 for the period since 1923. For the period leading up to 1972, the reference year of the sample data employed in this paper, there has not been a marked secular rise in immigration flows, but instead a series of peaks and declines as number of visas was generally tied to the business cycle. Indeed, by far the largest single one-year inflows (of 282,000) occurred in 1957 - the year following the Hungarian revolt, while the lowest (72,000) occurred in 1961. As a percent of total population, annual immigration peaked in the late 1950's and gradually declined thereafter. From 1951 to 1961, it averaged 1.14% per annum; while over 1961-71, it fell to 0.78% per annum. The source breakdown of the immigration flows certainly did change since the early 1950's away from traditional sources of the United Kingdom and northern and western Europe - see appendix Table A.1 - and more towards the U.S., less industrialized European countries, the English-speaking West Indies, and Asia.[7]

Green (1976) has pointed out that post-war immigration regulations in Canada have progressively become more restrictive. As the labor market for less skilled workers slackened in Canada in the late fifties and sixties and then developed relative shortages for skilled (particularly professional) workers, immigration policy shifted perspective from a more-or-less open-door policy towards traditional sources (though highly restrictive towards other racial groups) to a policy of tying immigration flows more to domestic skill needs, absorptive capacity, and short-run unemployment considerations (Green, pp. 34-42). Specifically, Order-in-Council P.C, 86 (January 1962) "directed Canadian immigration policy to an individual 'assessment basis' regardless of nationality" (Green, p. 239), thus formally substituting job market skill and likely success in adjusting for national or racial preference. Then Order-in-Council P.S. 1616 (October 1967) formalized the skill-based criterion by establishing a formal point system for assessing potential immigrants and distinguishing between dependents and close relatives of Canadian citizens. "Skill and educational attainment coupled with occupational needs in Canada represent the key to admission" (Green, p.42). Finally, in 1974 immigration policies were tightened further by requiring

[7] Several of these trends have continued apace with the share of immigrants from Latin America rising to 11.7% in 1971 and 12.8% in 1981, from Asia rising to 17.6% in 1971 and 39.5% in 1981, and from continental Europe falling to 29.0% in 1971 and 19.4% in 1981; while the share coming from the United States rose to 19.0% in 1971 and then fell back to 6.8% by 1981. (Chiswick, 1987, Table 4).

that a specific job be available for an applicant and that he be specifically identified as in line for that job prior to admission.

Table 2.1, Canadian Immigration 1923-1985

1923-27	127534
1928-32	96941
1933-37	12976
1938-42	12493
1943-47	35975
1948-52	130686
1953-57	163972
1958-62	96433
1963-67	154027
1968-72	147425
1973-77	170978
1978-82	118258
1983-85	87203

Source: Figures up to 1983 from Immigration Statistics 1983. Figures for 1984 and 1985 from Canadian Statistical Review (February 1987).

ii. Changing Immigrant Characteristics

In correlate with these progressively tightening regulations, the occupational and skill characteristics of immigrants have changed considerably over this period. As appendix Table A.2 shows, the percentage of immigration flows into primary work fell dramatically, into blue-collar work declined noticeably, and into white-collar work (particularly professional) more than doubled,[8] a markedly more rapid shift than occurred in the economy as a whole. Tables 2.2 and 2.3, estimated from the Job Mobility sample of this paper, show that the education characteristics of immigrants have fairly steadily risen along with those of their native-born cohorts. There is a hint of a suggestion, though, that the immigrant cohorts aged 40-54, who generally arrived in the late 1940's and early to mid-1950's, were relatively a bit better educated than their native-born colleagues. But from Table 2.4, it is seen that these same immigrant cohorts had significantly less civilian full-time work experience than the same native-born age cohorts. In summary, then, the observed relative skill characteristics of more recent immigrant cohorts do not appear to have declined from those of earlier cohorts.[9]

Comparing earnings regressions from the 1971 and 1981 Censuses for Canada, however, Chiswick and Miller (1986) find that the immigrant earnings profiles relative to those for native-born have fallen by 7-9 percentage points, The decline in the height of the immigrant profiles is found across all countries of origin, and most markedly for immigrants from the United States (a decline of over 20%) and from Asia

[8] As Green (1976) points out, "During the 1950's immigrant labour was largely concentrated in the semi- and unskilled areas like manufacturing, labourers, and primary workers. By the 1960's, however, their contribution to these occupations dropped dramatically. At the same time foreign labour's share in the growth of highly skilled white collar occupations, especially professional workers increased." (p. 218).

[9] This appears to differ from the experience of the United States (Chiswick, 1987, Table 5).

(by about 30%). While part of this decline may be due to cyclical factors and the higher unemployment rate in 1980 than in 1970 (7.5% vs. 5.9%), it draws attention to the similarity in relative earnings decline of immigrants in the U.S. (Chiswick, 1986b). It also then raises the question of the possible role of unmeasured or unobservable quality or cohort effects on immigrant earnings differentials and how to control for these. We examine such cohort shifts in more detail in the next section.

Before proceeding, there is one fundamental aspect of our empirical analysis that warrants mention. Because it consists of a single cross-section, the data set we employ provides observations on individual earnings for only one year, namely 1972. The findings of our empirical analysis, therefore, cannot be interpreted as evidence respecting immigrant assimilation effects, since such effects are inherently intertemporal and hence can only be observed over time. The various cohort effects examined in this paper are properly interpreted as referring to cross-section differences at a point in time, as distinct from the genuine intertemporal properties of life-cycle earnings trajectories that can only be inferred by tracking specific birth cohorts and immigrant cohorts over time. Thus, the sorts of questions to which our empirical findings pertain include, for example, questions such as: How do the mean 1972 earnings of foreign-born men vary across birth cohorts (i.e., by current age or year of birth) and across immigrant cohorts (i.e., by years since immigration or year of immigration), and how do they compare with the 1972 earnings of "similar" native-born men? Our findings do not provide direct evidence on questions such as: Compared to the experience of earlier immigrant cohorts, have the mean annual earnings of recent immigrant cohorts converged more or less rapidly to the mean annual earnings of "similar" native-born men?

Table 2.2

Average Years of Education for Native- and Foreign-Born by Age Cohort

Age Group	Native-Born	Foreign-Born	Difference ("t")	
25-29	12.36	12.64	.28	(0.90)
30-34	11.89	11.97	.08	(0.26)
35-39	11.01	10.94	-.07	(0.22)
40-44	10.62	11.08	.46	(1.34)
45-49	9.95	10.40	.45	(1.29)
50-54	9.96	10.50	.54	(1.45)
55-59	9.82	9.17	-.65	(1.25)

Source: Job Mobility Survey estimation sample

Table 2.3

Percentage of Native-Born and Foreign-Born with (1) Completed Post-Secondary School or Some University and (2) University Degree by Age Cohort

	Completed Post-secondary School		University Degree	
Age Group	NB	FB	NB	FB
25-29	21.3%	28.0%	12.1%	19.6%
30-34	21.5	23.8	13.6	24.6
35-39	13.1	20.8	11.9	20.0
40-44	13.8	20.0	10.1	19.2
45-49	12.3	21.4	7.3	11.9
50-54	13.4	19.1	7.0	14.5
55-59	13.1	9.8	7.5	7.8

Source: Job Mobility Survey estimation sample.

Table 2.4

Average Number of Years of Work Experience for Native-Born and Foreign-Born by Age Cohort

Age Group	Native-Born	Foreign-Born	Difference ("t")	
25-29	7.60	6.77	-.83	(1.67)
30-34	12.16	11.82	-.34	(0.63)
35-39	17.64	16.70	-.94	(1.73)
40-44	22.45	19.34	-3.11	(5.66)
45-49	27.33	24.78	-2.55	(4.58)
50-54	30.16	27.35	-2.81	(4.75)
55-59	35.20	34.96	-.24	(0.29)

III. Basic Regressions Results: Cohort Effects on Native- and Foreign-Born

i. Data Set and Estimation Sample

The Job Mobility Survey conducted by Statistics Canada was a supplementary questionnaire to the regular Monthly Labour Force Survey designed to investigate intergenerational social mobility in Canada. The estimation sample we look at consists of males, aged 25-64, who were paid employees with positive reported earnings in 1972 and non-missing responses[10] on key variables (i.e., major variables of interest in the earnings regressions below). [11]We shall examine this sample-selection criterion and its implications in more detail in Section V below. The resulting Estimation Sample consists of 5069 observations.

The estimation sample is broken down into subsamples of workers who are native-born and foreign-born. The number of foreign-born observations is 831 or about 16% of the estimation sample. The number of native-born in the sample is 4238, or about 84% of the estimation sample. Means for the principal variables of the analysis are presented in Table 3.1 for the estimation sample as a whole and for each of the two subsamples. Variable definitions for all variables used in the earnings regressions appear in Table 3.2. Standard deviations for the principal continuous variables are included in appendix Table A.3. As can be seen from Table 3.1, the immigrants on average are about a year and a half older than the native-born; have about the same average value of education (though with a much larger variance), experience, weeks of work, and marital status; and have a gross earnings advantage of $875 (in 1972 dollars). Compared to native-born Canadians, the immigrants tend to settle predominantly in Ontario (and to a lesser extent British Columbia) and especially in large urban areas. Their mother tongue is ten times more likely to be some language other than English or French -- indeed only a third cite English as their mother tongue, and less than five percent cite French. The average number of years since they immigrated to Canada is 18.4 which places their mean cohort as arriving in 1954-5. Their average age at time of arrival was 23 years.

The appendix Table A.4 matches up the arrival time of the immigrant cohorts in our foreign-born sample with the gross immigration flows from Table 2.1. Given our sample-selection rule, the arrival-time profile of immigrant cohorts in the estimation sample matches very closely the experience of cohorts in the population at large.

[10] Responses that were clearly faulty or inconsistent with other coding were thrown out and thus labelled as missing as well

[11] In some cases, trade-offs had to be made – typically in the case of family background variables – between the gain in potential bias reduction from including a particular variable and the loss of observations due to some missing responses to it.

Table 3.1, Means for Estimation, Native-Born, and Foreign-Born Samples

	Estimation Sample	Native-Born	Foreign-Born
Earn($)	8.986	9145	10020
Ln (Earn)	40.38	8.971	9.061
Age (years)	10.99	40.13	41.68
Ed (years)	20.07	10.98	11.03
Exp (years)	47.33	20.13	19.75
Weeks (weeks)	3.825	47.38	47.06
Ln (weeks)	0.403	3.827	3.811
Largcity	0.332	0.352	0.661
Medcity	0.265	0.355	0.217
Town or Rural	0.183	0.293	0.122
Atlantic	0.232	0.213	0.030
Quebec	0.271	0.252	0.131
Ontario	0.192	0.231	0.479
Prairies	0.122	0.194	0.177
Br. Col.	0.900	0.110	0.183
Marr	0.077	0.899	0.905
Single	0.023	0.079	0.067
OTHMS	0.247	0.022	0.028
Frenchmt	0.597	0.286	0.048
Englishmt	0.156	0.649	0.331
OTHMT	0.1639	0.065	0.621
FB	---	0.0	1.0
YSM	---	---	18.39
AGETM	---	---	23.29
Fb1	---	---	0.0915
Fb2	---	---	0.1877
Fb3	---	---	0.07208
Nobs	5069	4238	831

Table 3.2, Definition of Variables Used in the Regressions

(Variable names that are not capitalized are the default or omitted categories among a set of 0-1 dummies)

EARN	Total earnings for the previous calendar year (i.e., 1972).
In (EARN)	Dependent variable (also shortened to LYE).
ED	Years of formal schooling.
EXP	Years of work experience in the labour market (directly reported, not calculated by a Mincer-type identity).
In (WEEKS)	Log of the number of weeks worked in 1972.
FB	Equals one if respondent was foreign-born; zero otherwise
YSM	Number of years since immigration; defined only for foreign-born.
AGETM	Respondent's age at time of immigration; defined only for foreign-born
WKS13	Equals one if respondent worked one to thirteen weeks in 1972; zero otherwise
WKS1422	Equals one if respondent worked between 14 and 26 weeks in 1972; zero otherwise
WKS2739	Equals one if respondent worked between 27 and 39 weeks in 1972; zero otherwise
WKS4048	Equals one if respondent worked between 40 and 48 weeks in 1972; zero otherwise
WKS4952	Equals one if respondent worked 49 or more weeks in 1972; zero otherwise
HRSU19	Equals one if respondent's usual hours worked in 1972 were 19 or fewer per week; zero otherwise
HRSU2034	Equals one if respondent's usual hours worked in 1972 were between 20 and 34 per week; zero otherwise.
MHRSU	Equals one if respondent did not report his usual hours worked in 1972 (1.1% of the sample); zero otherwise.
Hrsu35+	Equals one if respondent's usual hours worked in 1972 were 35 or more (i.e., full-time); zero otherwise.
fbl	Equals one if AGETM 5; zero otherwise.
FB2	Equals one if 6 lc AGETM 17; zero otherwise.

FB3	Equals one if AGETM 18; zero otherwise.
LARGCITY	Equals one if respondent lives in urban area with population of 50,000 or greater; zero otherwise.
MEDCITY	Equals one if respondent lives in urban area with population between 1,000 and 50,000; zero otherwise.
Town or rural	Equals one if respondent lives in a town or rural area with population less than 1,000; zero otherwise.
ATLANTIC	Equals one if respondent lives in the Atlantic provinces; zero otherwise.
QUEBEC	Equals one if respondent lives in Quebec; zero otherwise.
Ontario	Equals one if respondent lives in Ontario; zero otherwise.
PRAIRIES	Equals one if respondent lives in the Prairie provinces; zero otherwise.
BR.COL	Equals one if respondent lives in British Columbia; zero otherwise.
MARR	Equals one if respondent is married; zero otherwise.
Single	Equals one if respondent is single (never married); zero otherwise.
OTHMS	Equals one if respondent is widowed, separated or divorced; zero otherwise.
Englishmt	Equals one if respondent's first language spoken (mother tongue) is English; zero otherwise.
FRENCHMT	Equals one if respondent's first language spoken (mother tongue) is French; zero otherwise.
OTHMT	Equals one if respondent's first language spoken (mother tongue) is neither English or French; zero otherwise.
Engjobl	Equals one if language spoken on first full-time job was English only; zero otherwise.
FRJOB1	Equals one if language spoken on first full-time job is French only; zero otherwise.
ENFRJOB1	Equals one if language spoken on first full-time job was both English and French; zero otherwise.

ii. Initial Conventional Regression

We begin analysis by looking at a particularly simple earnings equation that provides a descriptive feel for the data and facilitates comparison with conventional specifications in the literature (based on Census data with their limited set of variables). Several principal hypotheses, particularly associated with the work of Chiswick (eg., 1978), may be considered. First, since recently arrived immigrants may have less knowledge of skills and customs valued by the domestic labor market, their initial earnings upon acquiring a permanent job are expected to be less than the earnings of a "comparable" native-born worker. Second, as immigrants assimilate into the domestic labor market and acquire human capital skills and experience more specific to this market, the initial earnings deficiency narrows (i.e., immigrant earnings rise relative to the native-born as a function of the amount of time they have spent in the domestic market). Indeed, since immigrants have incentives to invest in human capital specific to the domestic market earlier after their arrival rather than later, the initial earnings gap is likely to narrow fastest early on and then at a slower pace as the rate of domestic skill acquisition slows. Third, since immigrants are likely self-selected to be more able and highly motivated to succeed economically, their earnings will eventually likely overtake those of native-born workers (i.e., the profile of immigrant earnings as a function of time since migration will eventually cross that for native-born).[12] Letting FB represent a dummy variable indicating foreign-born workers, YSM the years or time since migration to Canada, and LYE the log of earnings, one can formalize the first two hypotheses as (i) 8LYE/8FB < 0 and (ii) aLyuaYsm > 0 and 8^2Lyu8ysm^2 < O.

Accordingly, a simple conventional regression specification has been estimated for an earnings equation that pools both the native-born and foreign-born subsamples and includes the variable FB with an expected negative coefficient and a concave quadratic in the variable YSM for the foreign-born. The (log) earnings equation also includes the standard human capital variables for education (ED) and years of work experience (EXP) appearing quadratically. A squared term in education (ED^2) and an interaction term in ED and EXP (EDoEXP) were also included, as was a control for (the log of) number of weeks worked during the year. It should be noted that the experience variable is an actually reported figure rather than the conventional potential experience variable generated by a standard Mincer identity. Standard controls are also added for area of residence (ie., size of urban area) and province or region of residence -- with the omitted categories being a town or rural area in Ontario -- and for marital status (with single as the default category).

[12] One would also expect that each of these three effects would vary with how similar the country of origin is with the domestic labour market. But we do not pursue this issue in this paper.

The OLS estimation results of this initial simple specification are as follows (with t-ratios in brackets):

OTHJOB1 .....Equals one if language spoken on first full-time job was other than English or French; zero otherwise.

Engpjob..... Equals one if language spoken on present job is English only; zero otherwise.

FRPJOB ..... Equals one if language spoken on present job is French only; zero otherwise.

ENFRPJOB ……..Equals one if language spoken on present job is both English and French; zero otherwise.

OTHPJOB……..Equals one if language spoken on present job is other than English or French; zero otherwise.

PROFMAN..... Equals one if respondent was employed in professional, managerial, administrative or related occupations; zero otherwise.

CLERIC ..... Equals one if respondent was employed in clerical or related occupations; zero otherwise.

SALES..... Equals one if respondent was employed in sales or related occupations; zero otherwise.

SERVICE..... Equals one if respondent was employed in service occupations; zero otherwise.

PRIMARY..... Equals one if respondent was employed in primary or related occupations; zero otherwise.

CONSTR ..... Equals one if respondent was employed in construction, processing, or fabricating occupations; zero otherwise.

Equipop..... Equals one if respondent was employed in equipment operating or materials handling occupations; zero otherwise.

Primschl Equals one if person had no or only primary schooling; zero otherwise.

SOMEHS ..... Equals one if person had some high school; zero otherwise.

HSCHL ..... Equals one if person completed high school; zero otherwise.

SOMEPS ..... Equals one if person had some post-secondary schooling other than university; zero otherwise.

PSEC ..... Equals one if person completed some type of post-secondary schooling other than university; zero otherwise.

SOMEUN ..... Equals one if person had some university education; zero otherwise.

UNIV ..... Equals one if person completed a university degree; zero otherwise.

Nonworker……..Equals one if mother did not work full-time during the period of respondent's primary or secondary schooling; zero otherwise.

SOMEWKM ..... Equals one if respondent's mother worked full-time one or more but less than six years during respondent's primary or secondary schooling; zero otherwise.

WORKEDM ..... Equals one if respondent's mother worked full-time six or more years during respondent's primary or secondary schooling; zero otherwise.

Note: The postscript F at the end of a variable name refers to respondent's father. The postscript M at the end of a variable name refers to respondent's mother.

$$\begin{aligned} LYE = {} & 5.211 + .0328ED + .000881ED^2 + .0345EXP - .000701EXP^2 + .000322EDoEXP \\ & \quad (46.8) \quad (3.07) \quad (2.44) \quad (9.18) \quad (133) \quad (1.73) \\ & + .68951n(weeks) - .2059FB + .0198YSM - .000311YSW \\ & \quad (34.0) \quad (4.96) \quad (5.47) \quad (481) \\ & + .186LARGCITY + .99MEDCITY - .179ATLANTIC - .120QUEBEC \\ & \quad (10.9) \quad (5.9) \quad (8.89) \quad (6.62) \quad (3.1) \\ & - .118PRAIRIES + .095BR.COL. + .273MARR + 1840OTHMS \\ & \quad (6.24) \quad (0.25) \quad (11.5) \quad (3.91) \end{aligned}$$

R^2 = .4282 SSR = 978.4

F = 222.5 SER = .4401

Note, first of all, the very marked[13] negative coefficient on FB indicating that, on average, recent immigrants experience a 20% earnings gap compared to an "equivalent" native-born worker. The figure of 20% is on the high side compared to the U.S. literature (eg., Chiswick (1978) found 16%), but in line

[13] One hesitates to use the term "significant" since, relative to the more complete specifications estimated later, this equation is incompletely specified and thus with invalid t-statistics.

with other Canadian estimates for the period (Meng (1986) found an 18% gap and Chiswick and Miller (1984) a 24% shortfall). Note that the expected sign pattern on YSM and YSM^2 also comes through quite markedly. The differential earnings increase of immigrants in their first year after arrival (ie., the coefficient on YSM) is estimated as 2%. This compares to 11% for the U.S. by Chiswick (1978), 2% by Chiswick and Miller (1984), and about 3% by Meng (1986) -- the latter two both for Canada. The value of YSM for which foreign-born earnings equal native-born earnings is estimated to be 13 years.[14] Again, this compares to 13 years in Chiswick (1978) and 16 years in both Chiswick and Miller (1984) and Meng (1986).

The human capital effects offer no great surprises. The marginal return to education turns out to be increasing, although this may simply represent certification or occupation effects. The results also suggest some degree of complementarity between education and OJT human capital acquisition. The return to education evaluated at the sample mean of ED = 11 is computed as 5.2% at EXP = 0, and rises to 5.7% at EXP = 15 because of the estimated complementarity between years of schooling and years of work experience (the positive coefficient estimate for EDoEXP). The experience effect itself is of the standard concave quadratic pattern. The return to work experience, again evaluated at ED, is estimated as 3.8% at EXP = 0 and falls to 1.7% at EXP = 15. The earnings-experience profile is estimated to peak after 27 years of work experience (at ED).

The remaining coefficient estimates follow pretty traditional patterns. The elasticity coefficient on weeks worked, here estimated as .69, compares to .68 for Meng (1986) and .84 from the 1971 Census regressions of Chiswick and Miller (1984). Higher earnings are observed in larger urban areas and in Ontario and British Columbia (with the lowest earnings in the Atlantic Provinces and Quebec). Married workers and workers of "other" marital status also have higher earnings than single never-married men.

iii. Cohort Effects and Foreign-Born Interactions

The above specification is particularly simple in order to highlight the essentials of the immigrant earnings adjustment pattern and to facilitate comparison to conventional (Census-based) results in the literature. However, the specification has several limitations. The weeks-worked variable is treated as continuous, but in fact has to be constructed from mid-points of several rather broad interval categories. Since weeks worked enters solely as a control variable, is seems less restrictive and artificial to replace the log-of-weeks-worked variable by the underlying interval dummy variables themselves. Similarly, since this data set has information on hours usually worked per week last year as well,[15] this was also included as a set of interval dummies, again viewed as labour market controls essentially distinguishing part-time from full-time workers.

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[14] This figure is obtained from setting LYE(foreign-born) – LYE(native-born) = and solving the resultant quadratic in YSM:

$$-.205875 + .019824YSM - .000310555YSW = 0.$$

[15] Unlike the Census files which contain usual-hours-worked information only with respect to the week preceding the interview. Expressing the dependent variable as an hourly wage by dividing reported annual earnings by mid-point interval estimates of weeks worked per year and hours worked per week is considered a rather risky and undesirable procedure and hence is not done here.

In order to investigate birth-cohort effects on earnings, age is introduced as a separate earnings predictor distinct from directly reported work experience. Since year of birth, YRB, is the converse of AGE (ie., AGE = 1973 - YRB), birth cohort effects are represented by minus the impact of AGE. Also, since cohort or vintage effects can affect returns to education, work experience, and years since immigration, we wish to allow a fairly complete set of interactions of AGE with these variables. Finally, a quadratic in AGE is specified to allow cohort effects to vary with AGE itself.

Returns to various forms of human capital may vary between native- and foreign-born. As Chiswick (1978) points out, there are aspects of schooling which are country specific, so that formal education obtained prior to immigration is likely to yield a lower rate of return in terms of earnings than education for the native-born. Similarly, work experience prior to migration is likely to be of less value than work experience since arrival.[16] That is, one would expect generally different coefficients on education and work experience for native-born and foreign-born workers. The foreign-born interactions with education one would expect to be negative. Similarly, controlling for the length of time since immigration, one would expect a negative interaction with work experience for foreign-born. Furthermore, as Chiswick and Borjas point out, cohort effects may well differ between native-and foreign-born because of either domestic immigration policy changes, world events, immigration policy stance of other countries such as the U.S., or the domestic economy's ease of absorption of similarly skilled workers. Consequently, including FB interactions with the AGE variables would pick up such cohort effects.[17] More broadly, one could consider a complete set of FB interactions with all of the education-experience variables in the initial specification (3.1), as well as with all age variables, and then test which sets of interaction coefficients are significant.

The initial specification (3.1) is therefore expanded to include the following age and foreign-born interaction variables:

$$\text{AGE, AGE}^2\text{, EDOAGE, EXPoAGE}$$

$$\text{FB, FB.ED, FB0ED}^2\text{, FB.EXP, FB.EXP}^2\text{, FBOEXPOED} \qquad (3.2)$$

$$\text{FB.AGE, FB..AGE, FB.ED.AGE, FBoEXPoAGE}$$

$$\text{YSM , YSM}^2\text{, YSM.ED, YSM.EXP, YSMoAGE.}$$

[16] Once again, these effects are likely to differ according to country of origin, with the strongest effects occurring for immigrants from countries that are most different from the domestic labour market.

[17] In an earlier version of this paper, we considered interactions based on age at time of arrival for immigrants (rather than on age itself). This was represented by three dummy variables according to whether one arrived before school age (less than age 6), essentially during their schooling phase (between ages 6 and 17), or after age 17. In general, this was not a particularly successful approach partly because many of the age-at-arrival interactions were not significantly different from each other, but also because it didn't allow for continuous changes in cohort effects and the efficient testing of cohort-effect hypotheses that using the AGE variable does.

These can be interpreted as starting with a general second-order approximation to the unknown cohort-effect specification with FB interactions on all resulting cohort-effect and skill-based variables. Regressions with this general set of variables (as well as the above labour-market controls and other basic variables in equation (3.1) were run for each of four alternative earnings equation specifications (to be discussed at the beginning of Section IV), both with and without sample-selection adjustments (see Section V). Since some of these variables turned out repeatedly not significant across all eight cases, we decided, in favour of passimony and after formal F tests, to drop them. Specifically, in all eight cases, (indeed across numerous other specifications we tried as well), the largest set of variables from (3.2) that appeared jointly not significant was identical:

$$\begin{aligned} &FB.ED,\ FB.ED^2,\ FB.EXP,\ FB.EXP^2,\ FBoEXPoED \\ &FB.ED.AGE,\ FB.EXP.AGE,\ YSM.ED,\ YSM.EXP \end{aligned} \qquad (3.3)$$

The F-statistics for these nine joint restrictions all varied between 1.32 and 1.72, compared with a five percent significance cut off of $F(9,m) = 1.88$, so that the joint exclusion restrictions were sustained. The regression results reported in this paper that exclude the set of variable in (3.3) are accordingly referred to as having "limited foreign interactions". The key aspect of these restrictions is that they imply that the returns to education and work experience are the same for natives and immigrants.

However, individual variables within the general exclusion set (3.3) can turn out significant. Indeed, the two variables $FBoEXP^2$ and FBoEXPoAGE always appeared individually significant in all specifications. Since we had no prior expectation of this and didn't wish to indulge in ex post tailoring of exclusion restrictions, and since these variables (particularly FBoEXPoAGE) relate to a key aspect of the debate between the cohort-effect hypotheses of Borjas and Chiswick,[18] we decided not to change the restrictions in (3.3), but instead opted to report also those regression results that do not impose the joint restrictions. These results based on the full set of variables in (3.2) are labelled as having "full foreign interactions".

Obviously, they do allow rates of return to education and work experience to differ between natives and immigrants. Regression results incorporating the above considerations are presented in Table 3.3. The first column of Table 3.3 provides results for the specification with limited foreign interactions while the second column of results are for the regression with full foreign interactions. A number of exclusion restriction tests on various sets of regressors for the two equations are set out in Table 3.4, along with an explanation of several relevant characteristics computed for each equation and helpful in evaluating the regression results. The actual test results and computed characteristics of the equations are presented in summary form in Table 3.5.

One may also wish to examine completely unpooled or separate regressions for native- and foreign-born workers. This is the least restrictive form on which to base earnings comparisons, and corresponds to introducing a full set of interactions of the FB dummy with *all* the variables (other than those already involving YSM) in Table 3.3. Such results are provided in appendix Table A.8. Since the

[18] Vis., whether the earnings-experience profiles have shifted between cohorts for the economy as a whole (Chiswick, 1987, p.39).

principal foreign-born and cohort effects are virtually identical between the "full-foreign interactions" regression in Table 3.3 and the unpooled regressions in Table A.8, we limit our discussion just to the results in Table 3.3.

The summary regression statistics at the end of Table 3.3 generally indicate an improvement in fit relative to the basic specification in (3.1). The coefficients on the location and marital status controls remain essentially the same except for the coefficient on B.C. which falls, likely because of the more detailed hours/weeks controls and B.C.'s heavy concentration of primary industry jobs which are less likely to be full-time full-year. The education coefficients are generally similar to those in (3.1). The principal differences in coefficients from those in the basic specification are (i) the experience coefficients which fall (in absolute value) with the addition of the separate age controls, (ii) the FB intercept shift coefficient which now reflects the addition of extensive foreign-born interactions, and (iii) the YSM coefficients which now reflect the added YSM interactions.

The various sets of regressors in Table 3.3 are tested jointly in panel A of Table 3.5, and strong similarities can be seen between the restricted (column (1)) and unrestricted (column (2)) results. In both specifications, native-born and foreign-born age-cohort effects are highly significant, and so also are the overall joint foreign-born effects and the separate foreign-born age cohort affects. That is, there certainly do appear to be highly significant age cohort effects and they are distinctly different between native-born and foreign-born workers. Education effects do not appear to be significantly related to the foreign-born/native-born earnings differential, but (at the 90 percent level of confidence) differences in work experience patterns may. The various sets of basic control variables are all highly significant in both specifications; moreover, their coefficients also vary monotonically as one would expect.

Table 3.3, Regression Estimates of Log Earnings with Limited Controls (absolute value of t-ratios in parentheses)

	(1) Limited Foreign Interations	(2) Full Foreign Interactions
Const.	7.5023 (33.3)	7.5685 (29.2)
ED	0.350 (2.28)	0.413 (2.22)
$ED^2/100$	0.2513 (5.20)	0.2286 (3.50)
EXP	0.0144 (1.58)	0.0239 (2.20)
$EXP^2/100$	-0.0168 (1.27)	-0.0015 (0.11)
EXP.ED/100	0.2377 (5.33)	0.2368 (3.75)
WKS13	-1.0737	
WK1426	-0.8076 (15.7)	-0.8072 (15.8)
WKS2739	-0.4144 (13.7)	-0.4186 (13.8)
WKS4048	-0.1613 (6.52)	-0.1598 (6.48)
HRSU19	-0.8154 (6.08)	-0.8179 (6.07)
HRSU2034	-0.2081 (3.92)	-0.2039 (3.91)
MHRSU	-0.0914 (1.40)	-0.0866 (1.33)
AGE	0.0354 (3.05)	0.0254 (1.90)
$AGE^2/100$	-0.0233 (1.52)	-0.0047 (0.29)
ED.AGE/100	-0.1820 (4.14)	-0.1775 (2.88)
EXP.AGE/100	-0.0351 (1.51)	-0.0698 (3.00)
FB	-0.8687 (3.11)	-1.0140 (1.96)
FB.ED		-0.0213 (0.65)
$FB.ED^2/100$		0.0415 (0.43)
FB.EXP		-0.0216 (1.17)
$FB.EXP^2/100$		-0.0672 (2.13)
FB.EXP.ED/100		-0.0998 (1.07)
FB.AGE	0.0438 (3.12)	0.0687 (2.78)
$FB.AGE^2/100$	-0.0677 (3.54)	-0.1173 (3.70)
FB.ED.AGE/100		0.0227 (0.25)
FB.EXP.AGE/100		0.1229 (2.49)
YSM	-0.0025 (0.32)	-0.0059 (0.50)
$YSM^2/100$	-0.0526 (3.44)	-0.0436 (2.93)
YSM.ED/100		0.0589 (1.26)
YSM.EXP/100		0.0154 (0.69)
YSM.AGE/100	0.0736 (2.59)	0.0480 (1.45)
LARGCITY	0.1707 (9.89)	0.1679 (9.64)
MEDCITY	0.0822 (4.97)	0.0807 (4.88)
ATLANTIC	-0.1642 (8.47)	-0.1621 (8.33)
QUEBEC	-0.1029 (5.79)	-0.0990 (5.53)
PRAIRIES	-0.1073 (6.24)	-0.1066 (6.18)
BR.COL.	0.0210 (1.01)	0.0234 (1.13)
MARR.	0.2522 (9.08)	0.2516 (9.04)
OTHMS	0.1727 (3.09)	0.1750 (3.11)
R^2	0.4649	0.1750 (3.11)
F	145.90	112.87
SSR	915.71	912.52
SER	0.4263	0.4260

Table 3.4, Description of Exclusion Restrictions and Computed Characteristics of Regression Equations

A. Specification of Exclusion Restriction Tests

Test		Variables Excluded
a. Cohort effects		
i.	NBAGE	AGE, AGE^2, ED.AGE, EXP.AGE
ii.	FBAGE1	FB.AGE, $FB.AGE^2$, YSM.AGE
iii.	FBAGE2	FB.AGE, $FB.AGE^2$, FB.ED.AGE, FB.EXP.AGE, YSM.AGE
b. Foreign-born effects		
i.	FBALL1	FB,FB.AGE,$FB.AGE^2$, YSM, YSM^2, YSM.AGE
ii.	FBALL2	FB, FB.ED, $FB.ED^2$, FB.EXP, $FB.EXP^2$, FB.ED.EXP, FB.AGE, $FB.AGE^2$, FB.ED.AGE, FB.EXP.AGE, YSM, YSM^2, YSM.ED, YSM.EXP, YSM.AGE
iii.	FBEDEXP	FB.ED, $FB.ED^2$, FB.EXP, $FB.EXP^2$, FB.ED.EXP, FB.ED.AGE, FB.EXP.AAGE, YSM.ED, YSM.EXP
iv.	FBEDALL	FB.ED, $FB.ED^2$, FB.ED.EXP, FB.ED.AGE, YSM.ED
v.	FBED	FB.ED, $FB.ED^2$
vi.	FBEXPALL	FB.EXP, $FB.EXP^2$, FB.ED.EXP, FB.EXP.AGE, YSM.EXP
vii.	FBEXP	FB.EXP, $FB.EXP^2$
viii.	FBAGE	FB.AGE, $FB.AGE^2$
c. Basic labour market and regional/demographic controls		
i.	BCWEEKS	WKS13, WKS1426, WKS2739, WKS4048
ii.	BCHOURS	HRSU19, HRSU2034, MHRSU
iii.	BCURBAN	LARGCITY, MEDCITY
iv.	BCREGION	ATLANTIC, QUEBEC, PRAIRIES, BR. COL.
v.	BCMSTA	MARR, OTHMS

B. Computed ED/EXP Returns, Cohort Effects, and FB Effects

a. Returns to ED and EXP

DED = LYE/ED evaluated at ED = ED and either (i) EXP = 5, AGE = 25, and YSM = 0, or (ii) EXP = 20, AGE = 40, and YSM = 15.

DEXP = Lye/EXP evaluated at ED and either (i) or (ii) as in DED

b. Cohort effects

DAGE = LYE/AGE evaluated at ED and either (i) or (ii) as in DED.

YRB = Year of birth of cohort which had the highest estimated earnings for given level of work experience, evaluated at YSM = 0 and either (i) EXP = 0 or (ii) EXP = 10

YRPK = Year in which the cohort effect for the YRB cohort peaks, computed as YRB + EXP + 20 where EXP is evaluated at either (i) or (ii) as for YRB

c. Foreign-born effects

FB = Foreign-born earnings differential, evaluated at ED and either (i) or (ii) as in DED

DYSM = LYE/YSM evaluated at ED and either (i) or (ii) as in DED.

DEXP + DYSM = Sum of both effects, evaluated as above

YSM = Number of years since immigration at which the foreign-born earnings differential vanishes, evaluated at ED, EXP = 20, and AGE = 40

Table 3.5, Exclusion Restriction Tests and Computed Regression Characteristics for Equations in Table 3.3

A. Exclusion Restriction Tests

	Eq. in 3.3(1)	Eq. in 3.3 (2)
a. Cohort effects		
i. NBAGE	12.90**	10.70**
ii. FBAGE1	4.43**	
iii. FBAGE2		3.28**
b. Foreign-born effects		
i. FBALL1	5.28**	
ii. FBALL2		3.25**
iii. FBEDEXP		1.43
iv. FBEDALL		1.53
v. FBED		0.21
vi. FBEXPALL		1.67
vii. FBEXP		2.55+
viii. FBAGE	6.41**	7.55**
c. Basic controls		
i. BCWEEKS	134.8**	135.3**
ii. BCHOURS	17.62**	17.49**
iii. BCURBAN	50.38**	47.83**
iv. BCREGION	27.85**	27.56**
v. BCMSTA	42.23**	41.75**

B. Computed ED/EXP Returns, Cohort Effects, and FB Effects

	NB	FB	NB	FB
a. Returns to ED/EXP				
i. DED (i)	0.057	0.057	0.059	0.048
ii. DED (ii)	0.065	0.065	0.068	0.054
iii. DEXP (i)	0.030	0.030	0.032	0.024
iv. DEXP (ii)	0.020	0.020	0.021	0.013
b. Cohort effects				
i. DAGE (i)	0.0020	0.0120	0.0001	0.0188
ii. DAGE (ii)	-0.0103	-0.0095	-0.0118	-0.0027
iii. YRB* (i)	1940 (1960)	1940 (1960)	1910 (1930)	1941 (1961)
iv. YRB*(ii)	1948 (1978)	1942 (1972)	1983 (2013)	1939 (1969
c. Foreign-born effects				
i. FB* (i)		-0.196		-0.177
ii. FB* (ii)		-0.198		-0.164
iii. DYSM (i)		0.016		0.013
iv. DYSM (ii)		0.011		0.010
v. DEXP (i) + DYSM (i)		0.046		0.037
vi. DEXP (ii) + DYSM (ii)		0.031		0.023
vii. YSM*		8.89		8.62

Note: + indicates significant at 10% level. *
indicates significant at 5% level. **
indicates significant at 1% level.

The education and experience coefficients in Table 3.3 indicate several differences between the foreign-born and native-born earnings equations. The implied returns to education in panel B of Table 3.5 are

essentially the same here as for the basic regression (3.1). But the returns to work experience have been lowered by the inclusion of the separate age controls. For the native-born, initial returns to experience (at EXP = 0) vary between 3.0 -3.2% for the earnings function in Table 3.3, but equal 3.8% for the basic equation (3.1). The degree of complementarity between education and experience has also become highly significant. The unrestricted equation in Table 3.3(2) also allows different returns to human capital between natives and immigrants. The returns to education and experience (EXP) are both lower for foreign-born than for native-born men -- by about 20% for education and by 25-38% for work experience -- in accordance with the hypotheses cited above in 111.3. The reduction in returns earned by immigrants is relatively more accentuated for workers with more actual work experience as compared to those who recently joined the work force and so have little or no labour market experience.

Birth cohort effects on the earnings of native-born men have not followed a constant monotonic pattern over time. As rows 5 and 6 of the lower panel of Table 3.5 indicate, the cohort effect switches sign between young and middle-aged workers. For older ages (ie., earlier cohorts), 8LYE/8YRB = -aLYEpAGE > 0, so that a more recent year of birth is associated with higher earnings profiles as earnings generally shift up from one year to the next. For younger ages (ie., recent cohorts), 8LYE/8YRB < 0, indicating that a more recent year of birth is associated with lower earnings profiles as earnings now generally shift down over time -- though at a very small rate. Not only has there been a slowdown or flattening in the general rate of increase in earnings profiles over time in the economy, but these estimates indicate an actual decrease in the (real) earnings of the most recent cohorts of adult male workers. Clearly, there is a critical age level or birth cohort, YRB, at which the cohort effect (aLYE/8YRB) peaks and then starts turning negative. This is obtained by setting the expression for aLYE/aAGE to zero and then solving for AGE (or YRB) as a function of EXP. The results are given on lines 7 and 8 of panel B of Table 3.5. In the case of the "restricted" equation in the first column, for those just entering the labour market (case (i)), the "optimal cohort" was born in 1940 and reached its peak cohort earnings twenty years later in 1960. For those native-born with ten years of work experience, the optimal cohort was born in 1948 and is expected to have reached its peak cohort earnings thirty years later in 1978. That is, less experienced workers have faced an earlier reversal in their year-to-year earnings gains and have thus- lost out relative to more experienced workers; experience-earnings differentials have widened in recent years. The same pattern is also evident for native-born workers in the "unrestricted" equation in the third column of panel B, but has been greatly accentuated.

Returns to education and experience are thus seen to vary across age cohorts for native-born men. In the case of education, the negative ED.AGE interaction term is significant for both equations in Table 3.3. Thus more recent cohorts of workers realize higher marginal returns to their education; a ten-year difference between age cohorts amounts to a 1.8 percentage point difference in the returns to their education. In the case of experience, both equations also show a negative EXP.AGE interaction term, though only in the unrestricted regression is it (highly) significant. More recent cohorts thus face a steeper experience earnings profile as experience-based skill differentials widen among domestic workers in the economy presumably as a result of the large inflow of young and relatively experienced workers into the labour market during this period combined with low substitutability between younger and older male workers (Merrilees, 1982). By how much they widen depends upon the equation. In the unrestricted equation, one cohort ten years more recent than another faces an earnings profile steeper by 0.7 percentage points a year (or 22% steeper for an entering cohort); in the restricted equation, it is steeper by half that amount. So, consistent with Chiswick's finding for the U.S. in the 1970's, domestic

experience-earnings profiles for native-born Canadian men also appear to have steepened by the early seventies.[19]

Foreign-born workers also exhibit significant cohort effects that differ somewhat from those reported above for native-born men. Once again, the cohort effects in lines 5 and 6 of the lower panel of Table 3.5 change sign between young and middle-aged workers. The earnings profiles of earlier cohorts rise over time, while those of more recent cohorts shift down from year to year, *ceteris paribus.* But for earlier cohorts, the rise in earnings profiles (8LYE/8YRB = -aLYE/8AGE) is not as great as it is for native-born workers; while for more recent cohorts, the fall-off of gains has been sharper or more acute. The reversal in cohort effects between young recent job-market entrants (case (i) in line 5) and more experienced middle-aged workers (case (ii) in line 6) is .0119 - .0123 for native-born, while it is .0215 -- about twice as marked -- for foreign-born. Indeed, it is so strong that the optimal cohorts for experienced (case (ii) in line 8) and inexperienced (case (1) in line 7) immigrants have both been bunched together in the birth years 1939-1942 -- those who typically arrived in the early sixties. The greatest reduction in cohort effects between natives and immigrants, though, clearly occurs among the less experienced workers.

Cohort effects on the returns to experience also differ between native-and foreign-born men. In the case of education, the cohort effect on the returns to schooling is slightly smaller for immigrants (a combined ED.AGE interaction coefficient of -.00155 vs. -.00178 for natives), though the difference is not statistically significant. In the case of work experience, however, there is a very significant difference in age cohort effects; furthermore, it is sufficiently large to bring about a change in the direction of the effect. In the unrestricted regression of Table 3.3, the EXP.AGE coefficient for natives is -.00070, while for immigrants the combined interaction coefficient becomes +.00053. Thus recent foreign-born cohorts have experienced *not* a steepening of the earnings-experience profiles as have their native-born counterparts, but rather a *flattening* of their profiles. Instead of getting a larger rate of return on their work experience relative to earlier immigrant cohorts, they now get a reduced return. Thus recent, relatively young, immigrants with little experience face two cohort-related drawbacks compared to their predecessors who immigrated earlier: first, earnings-experience differentials have widened in the economy as native-born earnings profiles have steepened, so that inexperienced workers have more distance to catch up to the earnings of more experienced workers; and second, immigrants' own experience-earnings profiles have flattened making it more difficult to catch up to the earnings levels of the natives. So, while steepening domestic earnings profiles and widening skill differentials are part of the explanation of recently worsening immigrant earnings position, as hypothesized by Chiswick, they are apparently not the whole story of the Canadian experience.

One can further illustrate the difference in cohort effects between natives and immigrants. Evaluate the estimated earnings functions at the sample mean values of ED and EXP and consider the case of incoming immigrants for whom YSM = 0. Then graphs of the earnings equations as a function of year of birth, YRB, show how the cohort effect and resulting immigrant earnings differentials vary across birth cohorts. Figure 3.1 depicts these graphs for both equations in Table 3.3. The immigrant earnings differentials are evaluated for three age cohorts: ages 25 (YRB = 1948), 40 (YRB = 1933), and 60 (YRB

[19] Chiswick and Miller (1986), using Canadian Census data, find that between 1970 and 1980 immigrant earnings relative to native earnings declined by about eight percentage points, ceteris paribus.

= 1913). As can be seen, the differential gradually declines from the oldest cohorts to the middle-aged ones, reaching a minimum with the 1941 (restricted equation) or 1932 (unrestricted equation) cohorts. Since then, for more recent cohorts, the earnings differential has been increasing. These curves illustrate just the initial earnings differential when immigrants first enter the domestic labour market. As with the conventional specification (3.1), both equations in Table 3.3 indicate that recent immigrants start off with a sizeable initial earnings short-fall relative to native-born workers, FB*; but then this short-fall is reduced in concave quadratic fashion with increases in the length of time spent working in Canada (or years since migration, YSM), and eventually after a certain period (YSM*) the foreign-born earnings profile overtakes and crosses the native-born profile. As shown in rows 9 and 10 of panel B in Table 3.5, the initial earnings differential varies between 16 - 20% of native-born earnings -- much the same as indicated in the simpler conventional specification of (3.1); the smaller differential of 16% is that associated with the full set of foreign-born interactions. The earnings gradient with respect to YSM is positive (rows 11 and 12) and decreasing as the regressions have a highly significant negative quadratic term in YSM. The YSM terms pick up the earnings gains associated with the additional country-specific skills (such as increased language fluency, knowledge of domestic job opportunities, and familiarity with local personnel and work rules) acquired by immigrants after their arrival in Canada, and perhaps too their greater drive and work intensity relative to comparable native-born men. The YSM gradient is roughly half the size of the immigrants' EXP gradient already discussed and a bit smaller than that in the conventional specification (3.1) without a cohort control (i.e., .013 - .016 vs. .020). The combined EXP and YSM gradients (see rows 13 and 14) of immigrants exceed the natives' EXP gradient, so that eventually the formers' profile overtakes the latters'. This is estimated at the point of sample means to occur after less than nine years (see row 15.)--considerably shorter than the figure of 13 years estimated from the conventional equation (3.1).

The shape of the YSM earnings curve may also vary with different immigrant characteristics. In the restricted regression in the first column of Table 3.3, there are no foreign-born ED/EXP interactions, so the possible impact of different worker characteristics on the YSM curve is picked up only in the unrestricted regression specification with the full set of foreign-born interactions. Higher levels of educational attainment can be seen to increase (negatively) the initial earnings differential, FB*, and steepen the gradient of the YMS curve, but only mildly so, so that the cross-over point, YSM*, is slightly lengthened. That is, the YSM curve shifts as indicated in Figure 3.2. Analysis with respect to the effect of greater work experience on the YSM curve shows the same pattern as in Figure 3.2 for education. However, these results should not be accorded a great deal of confidence since the principal coefficients on which they are based are not statistically significant.

Perhaps of more interest is how the foreign-born YSM-earnings curve shifts across age cohorts. Here we shall refer to the restricted equation in Table 3.3 because the pattern is seen more easily and clearly; but the same pattern holds for both equations[20] It can be seen, first of all, that the YSM.AGE interaction is significantly positive, meaning that younger more recent immigrants face a flatter YSM curve than earlier immigrant cohorts. AGE, however, has a non-monotonic effect on FB*. For older and middle-aged cohorts (AGE > 32), $aFB^{*}pYRB > 0$, so that younger immigrants face a smaller initial earnings differential than older immigrants. But for cohorts younger than age 32, $aFB^{*}pYRB < 0$, indicating that younger immigrants face a larger initial earnings disadvantage relative to native-born workers. The result

[20] Indeed, the same pattern holds for all the tabulated equations in the paper.

is illustrated in Figure 3.3. The YSM curve in both cases generally swivels to the right,[21] so that (marginally) more recent cohorts of immigrants face a lengthened catch-up period (YSM*) before their earnings eventually overtake those of native workers. Indeed, this finding is again especially acute for younger recent arrivals who face *both* a widened initial earnings differential and a substantially flatter catch-up gradient. For an example that overlaps both cases, the YSM curve for immigrants born in 1933 starts at FB* = -.20 and crosses the horizontal axis at YSM* = 9, while the curve for the 1942 cohort of immigrants implies an initial differential of -.16 and takes 19 years to reach the horizontal axis.

So there are three distinct cohort effects occurring in recent years, all working to worsen the relative position of younger immigrants. First, the steepening of domestic earnings profiles and widening of experience-based skill differentials increases the distance that young immigrants have to catch up. Second, the flattening of their experience profiles reduces the return they get from their normal work experience relative to both earlier immigrants and native-born workers. And third, the flattening of their YSM-earnings curve further lengthens the period of Canadian residence required for their earnings to eventually break even with those of native-born workers. The last two effects clearly suggest that the steepening of domestic earning profiles and the widening of skill differentials are not the whole explanation of the worsening relative earnings situation of immigrants. It appears as if other factors are also at work specifically affecting the immigrants themselves since about the middle 1960's (rows 7. and 8., panel B of Table 3.5).

A variety of possible explanations can be suggested for these findings. One, given by Borjas (1985) and Chiswick (1986b) for the United States, is that immigrant "quality" has been decreasing as the country of origin of immigrants over the last couple of decades has been changing away from traditional sources (particularly the U.K. and Western Europe) from which immigrants integrate more rapidly into the domestic about market, toward non-traditional sources (particularly Asia and Latin America) from which immigrants likely encounter more difficulty assimilating into the Canadian work environment. Workers from such "foreign" environments may face more severe language difficulties (even though the "point system" used by Canadian immigration authorities seeks to favour those with greater language facility in English and French), more formidable adjustments to North American labour markets, and more marked racial discrimination in the job opportunities available to them (particularly in slack labour markets characterized by historically high unemployment rates).

A second factor associated with the shift toward lower-quality immigrants during this period may be the 1965 Amendments of the U.S. Immigration and Nationality Act of 1952. These opened up occupational preference visa opportunities to the United States for Asians who were professionals or skilled workers and who might otherwise have immigrated to Canada. Consequently, fewer of the most able and professionally aggressive workers, particularly of Asian origin, who wished to emigrate from their native lands may have applied to enter Canada; or if already in Canada such workers may have migrated into the U.S. from Canada; or they may simply have passed through Canada on the way to the U.S. after only a brief interval of residence in Canada. As a result, those remaining in Canada are self-selected to be less able and aggressive in the labour market. Since, after the 1965 Amendments, a number of the most successful Asian or other immigrants to Canada may have left, Canadian employers may have viewed

[21] In panel A, the curves reflect that the flattening of the YSM gradient is substantial while the reduction in the FB* differential is rather small (the empirically relevant case). Consequently, the YSM* shifts to the right.

those who remained as more transient and less attached to jobs in Canada. Consequently, those workers who stayed may have suffered some statistical discrimination in the job opportunities available to them and in the human capital employers were likely to invest in them. Indeed, Chiswick (1987) has remarked that Asian immigrants have done relatively well in the U.S. but relatively poorly in Canada in spite of their high average level of education, even after controlling for their shorter average duration of Canadian residence.

But there are several other considerations, not associated with declining immigrant quality that may be at work as well. A third factor entails the joint language - French - separatist issues of the late sixties and the seventies. On the one hand, as Chiswick (1987) points out, the emphasis on bilingualism in English and French increased the language adjustment demands on immigrants and perhaps restricted their job opportunities relative to the opportunities available to earlier immigrants. On the other hand, and perhaps of greater consequence, the political unrest and uncertainty may have prompted newer immigrants to avoid Quebec and instead to congregate in Ontario. As Table 3.1 shows, the proportion of Canada's foreign-born population that resides in Quebec is only about half that province's share of the native-born population, whereas almost half of all foreign-born in Canada reside in Ontario, particularly the Toronto metropolitan area. Consequently, there is a greater concentration, and hence greater relative supply of recent immigrants in selected regions of the country so that (to the extent they are imperfect substitutes for natives in the labour market) their relative wages are lowered. Recent immigrants may also have exhibited a greater tendency to settle together in specific ethnic neighbourhoods in these areas, thereby retarding their rate of assimilation relative to that of earlier immigrant cohorts.

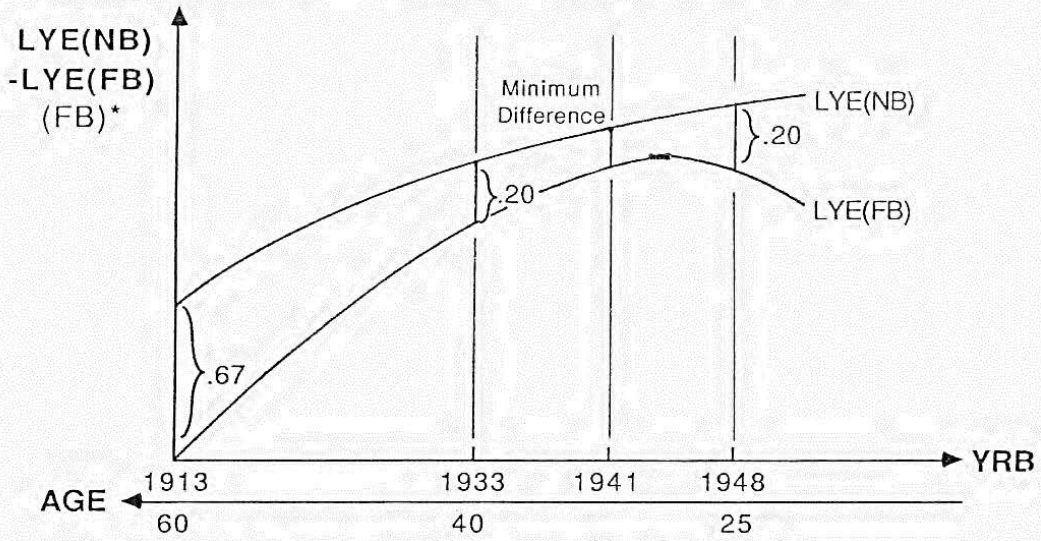
Related to this is a fourth factor -- the dramatically changed occupational characteristics of recent immigrants. As shown in Table A.2, the occupational mix of immigrants has shifted away from primary and relatively unskilled jobs towards higher skilled and professional jobs that are more likely concentrated in (a smaller number of) large urban centres. Once again, this leads to more direct competition for jobs with domestic workers; and the increased relative supply of immigrants in these largely urban jobs lowers their relative wages.

Fifth, discrimination against the foreign-born -- particularly against visible racial or linguistic groups -- may have increased in Canada over this period. Such discrimination may arise simply from an increase in the
relative numbers and evident presence of readily identifiable immigrant groups such as Asians (Becker, 1971). Or it may arise from higher unemployment rates that began in the late 1960's that lengthened job queues and provided greater opportunity for employer discrimination (Thurow, 1969) in hiring foreign workers. Their potentially greater transience and lack of language fluency may have resulted in statistical discrimination against them (Cain, 1977). Pressure to hire bilingual or French-speaking workers within the federal government may have closed the doors to (federal) government jobs that were formerly available to non-French-speaking immigrants. Progressively tightening immigration restrictions and professional restrictions (eg., where an immigrant medical doctor may initially practice) may also have made it administratively more costly for employers to hire recent immigrants and hence reduced the wages employers were willing to pay them.

FIGURE 3.1

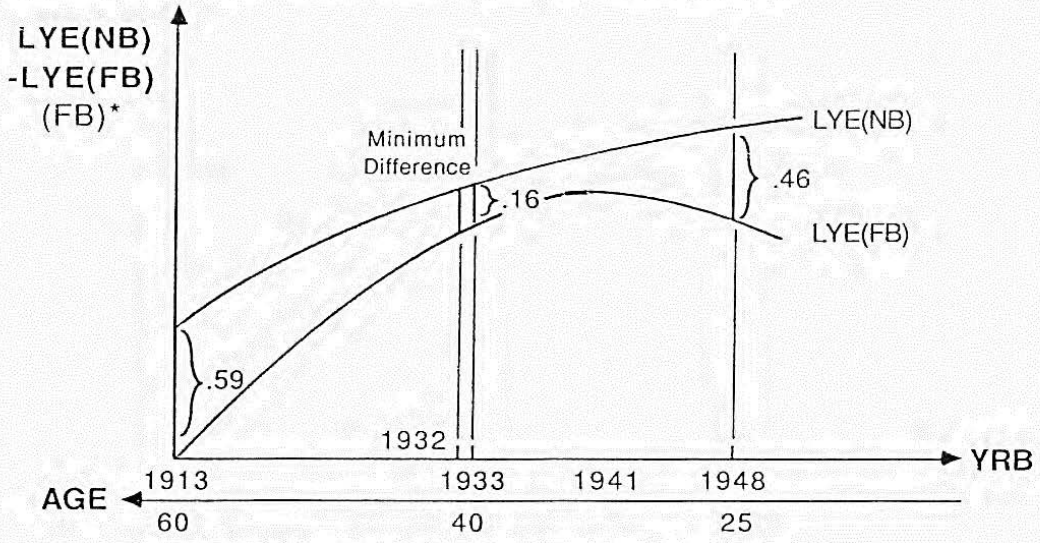
Initial Log-Earnings Differentials Between Native- and Foreign-Born by Year-of-Birth Cohort
(evaluated at $\overline{ED}$, $\overline{EXP}$, and YSM = 0)

A) Regression With Limited Foreign Interactions



SOURCE: Regression results in Table 3.3.

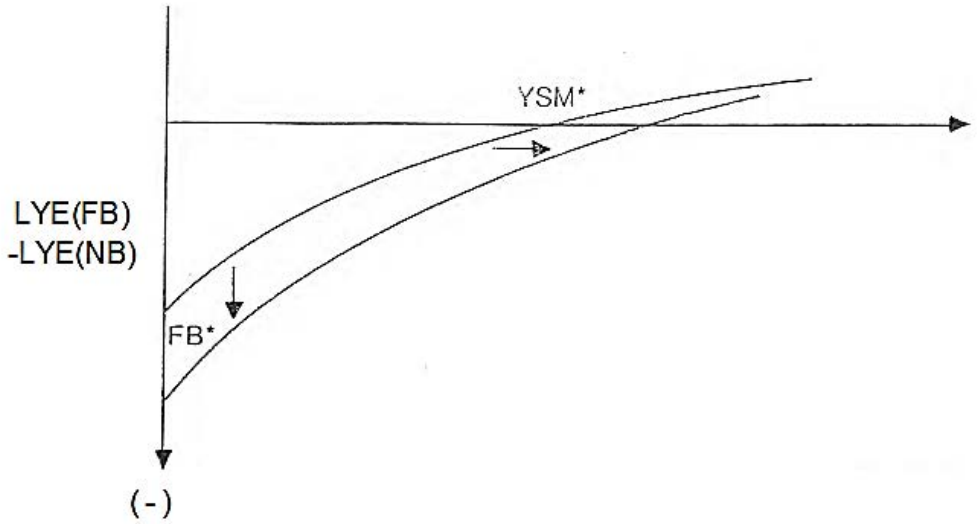
B) Regression With Full Foreign Interactions



SOURCE: Regression results in Table 3.3.

FIGURE 3.2

Effects of Greater Education or Work Experience on the Earnings Differential Between Native- and Foreign-Born (as a Function of Years Since Migration)

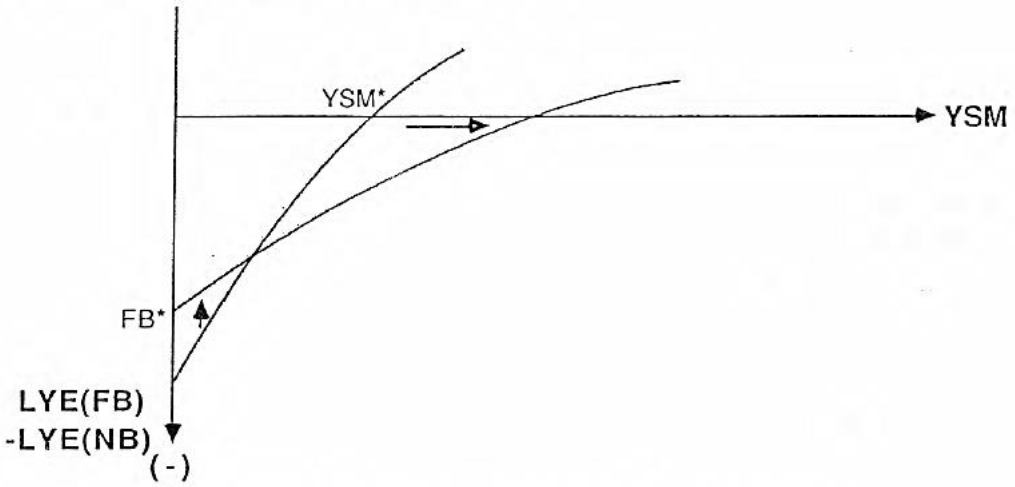


SOURCE: Regression results in Table 3.3 (column 2).

FIGURE 3.3

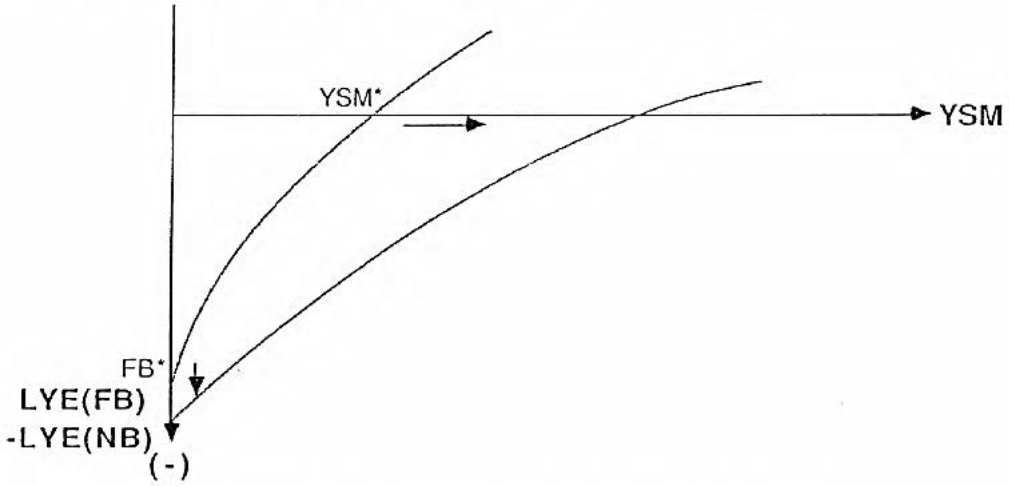
The Earnings Differential Pattern Between Native- and Foreign-Born
(as a Function of Years Since Migration)
Faced by More Recent Immigrants

A) For Older Cohorts (AGE ≥ 32)



SOURCE: Regression results in Table 3.3 (1).

B) For Younger Cohorts (AGE < 32)



SOURCE: Regression results in Table 3.3 (1).

Sixth, immigrants typically have demonstrated a greater incidence of self-selection into self-employment than have native-born individuals (Borjas, 1986). This appears to be true in Canada as well as in the United States (Abbott and Beach, 1987). The estimation sample in this paper (as in the work of others as well, such as Borjas, 1985) consists exclusively of paid employees. Immigrants may choose self-employment over paid employment for several reasons: to service particular ethnic tastes, particularly in the case of non-professionals; to avoid possible racial discrimination against them on the part of Canadian employers; to provide greater opportunity for longer hours of work and greater effort; and to make better use of entrepreneurial skills that are likely in greater evidence among the foreign-born (particularly those from areas of the world where the costs of adjustment are greatest) than among the native-born population at large. If, then, those who enter self-employment are on average more able, aggressive and successful in the labour market than the typical paid employee, an increased incidence of immigrant self-employment associated with the shift towards non-standard sources of immigrants could result in a relative decline in the earnings of foreign -born paid workers compared to otherwise similar native-born paid workers.

Finally, there is the fact that the 1960's and 1970's in Canada saw a rapid growth in government-sponsored social security and social services, particularly in the areas of health, education, pensions, welfare payments, and old-age security. Faced with a more generous government transfer and social security "safety net", more recent immigrants may not have felt as strongly compelled to work hard and to enhance their earnings capacity as did former cohorts of immigrants. This may be particularly so if more recent cohorts of adult male immigrants have more frequently arrived as part of intact families with accompanying dependents which can be more generously supported by government transfers and services now than in previous generations, rather than arriving first by themselves, working hard to get established, and then sending for the rest of the family to come over to Canada. In short, incentives to strive for higher earnings as soon as possible may have been attenuated.

These explanations for the apparent reduction in quality of more recent immigrant cohorts are, given present knowledge and evidence, speculative and conjectural. Further investigation of the validity of such explanations in itself constitutes an ambitious undertaking that clearly warrants further research.

IV. Full Regression Controls: Language, Ethnicity and Family Background

i. Additional Background and Control Variables

One of the objectives of this study is to analyze how immigrant earnings differentials and workers' earnings patterns in general are affected by parental family background and particularly language and ethnicity (i.e., mother tongue). These make use of the uniquely detailed background data available in the Job Mobility Survey data for Canada. We consider three blocks of additional regressors to those already discussed in the last section.

The first block of additional regressors are language variables. Language, the last ten years, has become a topic of some interest in the literature on earnings and wage equations. In Canada, studies by Vaillancourt (1980), Carliner (1981), Grenier (1986), and Robinson (1987) have examined the earnings differences between English and French.In the United States, work by McManus, Gould and Welch (1983) and others has focused on Hispanic wage differences. Language can essentially serve two roles in an earnings equation. Current fluency in a language of frequent use in the labor market affects the range of tasks a worker can perform and how well he can perform them. It is thus a skill that affects his labour market productivity and remuneration. It may have been learned very early as a mother tongue or learned later at school or on the job as a form of human capital acquisition. As such, one would expect greater language skills (such as ability to function fluently in both English and French in Canada) to be rewarded with higher earnings. But language, particularly mother tongue, can also serve as the basis for ethnic labelling and potential labour market discrimination. To this extent, a mother tongue variable may receive a negative return. Evidence from the 1971 Census, for example, indicates that French mother tongue is associated with lower mean earnings compared to English mother tongue.

The Job Mobility Survey data file used in this study contains several sets of language variables, of which we have used three. The first is mother tongue (or language first spoken at home) which Chiswick and Miller (1984, 1986) use as the basis of determining French ethnicity. Using English mother tongue as the default category, separate dummies are identified for French mother tongue and for mother tongue other than French or English. The second is language spoken on first full-time job. This represents an intermediate stage between between mother tongue and current language fluency and, like mother tongue, is more likely to be truly exogenous with respect to current earnings. Relative to the default category of English only, dummy variables are defined for French only, both French and English, and neither English nor French. The third language variable is language spoken on present job; this clearly reflects language skills acquired over the worker's career, and is coded the same as language on the first job. The first set of language variables representing mother tongue is truly a characteristic of the individual -- in particular, of the individual's parental family -- while the third set, and to some extent the second set, of language variables may be viewed more as characteristics or requirements of the job. The Census data files typically used for immigrant earnings studies contain information only on the first and third of these sets of language variables.

The second additional block of regressors is a set of standard occupational controls. This is particularly useful in the present case where we have seen that immigrants' occupational mix has changed considerably over the years. The occupation controls allow one to better isolate common underlying earnings patterns net of specific labor market sector effects.[22] The seven major occupational categories are defined in terms of dummy variables in Table 3.2, with the default occupational category consisting of equipment operating or materials handling occupations.

The third set of additional controls consists of variables representing various aspects of the respondent's parental family background. One advantage of the Job Mobility Survey data file is that it contains separate background information on the respondent's mother and father. Father's occupation and educational attainment may proxy the socio-economic milieu in which the individual grew up, the broad level of family resources available, and perhaps too expectations of achievement that were imparted to the respondent. Father's occupation is coded in the same way as the respondent's occupation. Father's education is also entered as a set of seven dummy variables; these correspond to educational attainment levels ranging from only primary schooling or less (the default category) up to completion of a university degree -- again see Table 3.2 for details. Considerable literature the last decade on the topic of home-produced human capital (Leibowitz, 1974a and 1974b) has focused on the critical influence of mother's education on the child's early career achievements – particularly his educational attainment. Since mothers typically spend much more time with their young children than do fathers, and more educated mothers particularly so, the effect of mother's education on a child's economic achievement is expected to exceed that of father's -- at least early on in the respondent's career. A separate set of seven educational dummy variables, identical to that for father's education, is thus introduced to control for the effect of mother's education on respondent's earnings. Finally, the Job Mobility Survey file also has information on the mother's full-time work pattern while the respondent was essentially of school age. According to the home-produced human capital perspective, the less time the mother is around while the child is growing up, the lower her time inputs in raising him, and the lower his prospective economic achievement. On the other hand, the higher family income associated with working mothers can raise the expenditure inputs into child rearing and thereby have the opposite result. Dummy variables are introduced for respondents whose mothers worked 1 - 5 years while they were of school age and for those whose mothers worked six years or more full-time while the respondent was in school; the default category consists of respondents whose mothers worked one year or less full-time while the respondent was in school.

ii. Estimation Results with Full Regression Controls

Each of the three blocks of additional regressors was introduced into the estimated earnings functions separately, then sequentially, and then all together. As it turns out, the principal results are virtually the same in all cases. So the latter results with the full set of additional controls are presented in Table 4.1. The additional variables are defined in Table 3.2. As before, two sets of regression results are reported: one (the "restricted" regression results in column (1) of Table 4.1) include only the limited foreign-born interaction terms that result from imposing the joint restrictions in (3.3); the other (the "unrestricted" regression results in column (2) of Table 4.1) incorporates a full set of foreign-born interaction terms

[22] In principle, one could also introduce industry effects as well; but these turn out in many cases to be highly collinear with the occupation variables.

Table 4.1

Regression Estimates of Log Earnings with Full Controls
(absolute value of t-ratios in parentheses)

	(1) Limited Foreign Interactions		(2) Full Foreign Interactions	
const.	7.6383	(34.4)	7.6510	(29.7)
ED	.0293	(1.92)	.0399	(2.11)
$ED^2/100$	.1953	(3.90)	.1657	(2.48)
EXP	.0161	(1.83)	.0245	(2.35)
$EXP^2/100$	-.0144	(1.16)	-.0001	(0.01)
EXP.ED/100	.2255	(5.09)	.2286	(3.79)
WKS13	-1.0664	(11.5)	-1.0602	(11.4)
WKS1426	-.7867	(15.6)	-.7860	(15.6)
WKS2739	-.4063	(13.6)	-.4097	(13.7)
WKS4048	-.1609	(6.69)	-.1590	(6.64)
HRSU19	-.8069	(6.32)	-.8127	(6.35)
HRSU2034	-.1992	(3.91)	-.1964	(3.92)
MHRSU	-.1032	(1.55)	-.0985	(1.48)
AGE	.0324	(2.87)	.0244	(1.88)
$AGE^2/100$	-.0198	(1.35)	-.0027	(0.18)
ED.AGE/100	-.1680	(3.85)	-.1720	(2.92)
EXP.AGE/100	-.0397	(1.82)	-.0723	(3.31)
FB	-.8386	(3.12)	-.7105	(1.45)
FB.ED			-.0425	(1.37)
$FB.ED^2/100$			.0803	(0.85)

-Table Continued-

Table 4.1 (Continued)

	(1) Limited Foreign Interactions		(2) Full Foreign Interactions	
FB.EXP			-.0175	(0.99)
FB.EXP^2/100			-.0625	(2.05)
FB.EXP.ED/100			-.1069	(1.18)
FB.AGE	.0409	(3.04)	.0581	(2.43)
FB.AGE^2/100	-.0632	(3.45)	-.1075	(3.47)
FB.ED.AGE/100			.0495	(0.56)
FB.EXP.AGE/100			.1153	(2.38)
YSM	-.0028	(0.37)	-.0077	(0.69)
YSM^2/100	-.0510	(3.42)	-.0421	(2.90)
YSM.ED/100			.0616	(1.39)
YSM.EXP/100			.0098	(0.45)
YSM.AGE/100	.0714	(2.62)	.0507	(1.58)
LARGCITY	.1523	(8.86)	.1499	(8.67)
MEDCITY	.0812	(5.05)	.0795	(4.92)
ATLANTIC	-.1697	(8.89)	-.1677	(8.77)
QUEBEC	-.0281	(0.98)	-.0294	(1.02)
PRAIRIES	-.1105	(6.42)	-.1093	(6.31)
BR.COL.	.0236	(1.15)	.0260	(1.28)
MARR	.2378	(8.74)	.2376	(8.74)
OTHMS	.1677	(3.17)	.1702	(3.20)
FRENCHMT	-.0305	(1.00)	-.0264	(0.86)
OTHMT	.0209	(0.96)	.0177	(0.80)

-Table Continued-

Table 4.1 (Continued)

	(1) Limited Foreign Interactions		(2) Full Foreign Interactions	
FRJOB1	-.0698	(1.86)	-.0719	(1.91)
ENFRJOBI	-.0175	(0.57)	-.0219	(0.70)
OTHJOB1	-.0725	(1.89)	-.0921	(2.30)
FRPJOB	-.0712	(1.56)	-.0637	(1.39)
ENFRPJOB	.0365	(1.04)	.0395	(1.12)
OTHPJOB	-.0013	(0.01)	-.0627	(0.67)
PROFMAN	.1286	(5.86)	.1262	(5.73)
CLERIC	-.1630	(7.10)	-.1650	(7.16)
SALES	-.0153	(0.59)	-.0189	(0.73)
SERVICE	-.1688	(6.56)	-.1729	(6.76)
PRIMARY	-.0917	(2.49)	-.0941	(2.56)
CONSTR	.0419	(2.39)	.0383	(2.19)
PROFMANF	.0224	(0.69)	.0237	(0.73)
CLERICF	.0249	(0.77)	.0250	(0.78)
SALESF	.0365	(1.25)	.0380	(1.31)
SERVICEF	-.0001	(0.00)	.0008	(0.03)
PRIMARYF	.0045	(0.20)	.0040	(0.18)
CONSTRF	.0308	(1.44)	.0311	(1.46)
SOMEHSF	.0393	(1.97)	.0393	(1.98)
HSCHLF	.0407	(1.63)	.0411	(1.66)
SOMEPSF	-.0260	(0.70)	-.0276	(0.74)
PSECF	.0250	(0.85)	.0305	(1.03)

-Table Continued-

Table 4.1 (Continued)

	(1) Limited Foreign Interactions		(2) Full Foreign Interactions	
SOMEUNF	-.0063	(0.11)	-.0078	(0.14)
UNIVF	.1020	(2.24)	.1047	(2.29)
SOMEPSM	.0158	(0.85)	.0157	(0.84)
HSCHLM	.0333	(1.46)	.0326	(1.43)
SOMEPSM	-.0029	(0.05)	-.0043	(0.08)
PSECM	.0236	(0.86)	.0239	(0.87)
SOMEUNM	-.0508	(0.41)	-.0447	(0.36)
UNIVM	.1074	(2.01)	.1123	(2.09)
SOMEWKM	-.0607	(2.61)	-.0603	(2.61)
WORKEDM	.0404	(2.10)	.0386	(2.01)
R^2	.4972		.4991	
F	77.31		68.17	
SSR	860.46		857.25	
SER	.4147		.4143	

involving all the terms in (3.2). Corresponding to these additional regressors are further sets of joint exclusion restrictions described in Table 4.2. The joint test statistics and computed regression characteristics for the two equations with full controls are presented in Table 4.3.

Once again, we have also estimated completely separate (i.e., unpooled) earnings regressions for native-born and foreign-born workers, the results for which are reported in the appendix Table A.9. Since the principal foreign-born and cohort effects are essentially the same for the full-foreign interaction specification in Table 4.1 and for the results in Table A.9, the discussion is restricted to the regression results in Table 4.1.

Inclusion of the additional sets of regressors yields a significant improvement in overall fit of the regressions.[23] The only major change in the coefficients of the previously included regressors is a marked reduction in the Quebec coefficients from -.10 to -.03; however, this coefficient is no longer significant once respondent's language characteristics are controlled for. No coefficient changed sign, and essentially all major coefficients significant before remain significant. The coefficients on the education variables are generally reduced somewhat (in absolute size) by the introduction of the controls for respondents' occupation and family background, but not so those on the experience variables. Also the pattern of coefficient test statistics remains the same in Table 4.3 (panel A) as in Table 3.5 (A).

The new language variables in Table 4.1 are jointly significant as one would expect. But it is interesting to note that the most significant language variables are those for language spoken on the job, particularly the present job, rather than mother tongue (see rows 18 - 20, panel A of Table 4.3). That is, it is the language characteristics of the job, and not the ethnicity characteristics of the respondent, that predominantly count. This is a rather interesting and distinctive result since the Census-based studies of Chiswick and Miller (1984, 1986) introduced either mother tongue variables or current language proficiency variable in their regression, but not both sets of language variables together.[24] The individual language coefficients indicate that French mother tongue has an insignificant earnings effect of -3%, while speaking French-only on the present job reduces earnings by a significant 6 - 7% (on a 10% one-tailed test). Relative to speaking English-only, being bilingual on the initial job reduces earnings by (a nonsignificant) 2% while using both languages on current job offers a (still nonsignificant) 4% premium.[25] The human capital aspect of language acquisition eventually pays a return, but it has some distance to overcome. Note also that the returns to a native French speaker becoming fluent on the job in both languages are much greater than are those for a native English speaker.[26] The coefficients for respondents' occupation are jointly highly significant and vary between +13% for the professional and managerial category and -17% and -16% respectively for the service and clerical occupations.

[23] F-statistics for the full group of 34 additional regressors are 9.45 and 9.47.
[24] Meng (1986) controls for mother tongue and present language proficiency in his regressions but doesn't report any results.
[25] In further work, one might want to analyze the pattern of language effects between government workers and non-government workers.
[26] One might also wish to analyze how these language returns differ for workers inside Quebec versus outside Quebec.

Table 4.2
Specification of Further Exclusion Restriction Tests

Test	Variables Excluded
a. Language Effects	
1. LANGALL	FRENCHMT, OTHMT, FRJOB1, ENFRJOB1, OTHJOBI, FRPJOB, ENFRPJOB, OTHPJOB
2. LANGMT	FRENCHMT, OTHMT
3. LANGJOB1	FRJOB1, ENFRJOB1, OTHJOB1
4. LANGPJOB	FRPJOB, ENFRPJOB, OTHPJOB
b, Occupation Effects	
5. OCCALL	PROFMAN, CLERIC, SALES, SERVICE, PRIMARY,CONSTR
c. Family Background Effects	
6. FAMILYALL	PROFMANF, CLERICF, SALESF, SERVICEF, PRIMARYF, CONSTRF, SOMEHSF, HSCHLF, SOMEPSF, PSECF, SOMEUNF, UNIVF, SOMEHSM, HSCHLM, SOMEPSM, PSECM, SOMEUNM, UNIVM, SOMEWKM, WORKEDM
7. FATHRALL	PROFMANF, CLERICF, SALESF, SERVICEF, PRIMARYF, CONSTRF, SOMEHSF, HSCHLF, SOMEPSF, PSECF, SOMEUNF, UNIVF
8. MOTHRALL	SOMEHSM, HSCHLM, PSECM, SOMEPSM, UNIVM, SOMEUNM, SOMEWKM, WORKEDM
9. FATHROCC	PROFMANF, CLERICF, SERVICEF, SALESF, PRIMARYF, CONSTRF
10. FATHRED	SOMEHSF, HSCHLF, SOMEPSF, PSECF, UNIVF SOMEUNF,
11. MOTHRED	SOMEHSM, HSCHLM, PSECM, SOMEPSM, UNIVM SOMEUNM,
12. MOTHRWK	SOMEWKM, WORKEDM

Table 4.3, Exclusion Restriction Tests and Computed Regression Characteristics for Equations in Table 4.1

A. Exclusion Restriction Tests

	EQ. in 4.1 (1)	Eq. in 4.1(2)
a. Cohort effects		
i. NBAGE	12.37**	10.69**
ii. FBAGE1	4.29**	
iii. FBAGE2		3.06**
b. Foreign-born effects		
i. FBALL1	4.61**	
ii. FBALL2		3.05**
iii. FBEDEXP		1.72+
iv. FBEDALL		2.11+
v. FBED		0.94
vi. FBEXPALL		1.73
vii. FBEXP		2.23
viii. FBAGE	6.12**	7.02**
c. Basic controls		
i. BCWEEKS	134.4**	134.6**
ii. BCHOURS	18.90**	18.93**
iii. BCURBAN	39.44**	37.86**
iv. BCREGION	29.13**	28.85**
v. BCMSTA	38.95**	38.87**
d. Language effects		
i. LANGALL	5.62**	5.42**
ii. LANGMT	1.14	0.82
iii. LANGJOB1	2.34	2.90*
iv. LANGPJOB	4.19**	4.04**
e. Occupation effects		
i. OCCALL	42.95**	42.92**
f. Family background effects		
i. FAMILYALL	2.21**	2.26**
ii. FATHRALL	1.35	1.42
iii. MOTHRALL	2.69**	2.66**
iv. FATHROCC	0.85	0.89
v. FATHRED	1.74	1.83+
vi. MOTHRED	0.99	1.03
vii. MOTHRWK	6.83**	6.60**

B. Computed ED/EXP Returns, Cohort Effects, and FB Effects

	NB	FB	NB	FB
a. Returns to ED/EXP				
i. DED (i)	0.042	0.042	0.045	0.027
ii. DED (ii)	0.050	0.050	0.053	0.036
iii. DEXP (i)	0.029	0.029	0.032	0.025
iv. DEXP (ii)	0.019	0.019	0.021	0.014
b. Cohort effects				
i. DAGE (i)	0.0020	0.0114	0.0005	0.0161
ii. DAGE (ii)	-0.0100	-0.0088	-0.0111	-0.0029
iii. YRB* (i) (YRPK)	1938 (1958)	1940 (1960)	1872 (1892)	1942 (1962)
iv. YRB* (ii) (YRPK)	1948 (1978)	1942 (1972)	2004 (2034)	1940 (1970)
c. Foreign-born effects				
i. FB* (i)		-0.210		-0.180
ii. FB* (ii)		-0.212		-0.170
iii. DYSM (i)		0.015		0.012
iv. DYSM (ii)		0.010		0.009
v. DEXP (i) + DYSM (i)		0.045		0.037
vi. DEXP (i) + DYSM (ii)		0.030		0.023
vii. YSM*		10.39		9.87

Note: + indicates significant at 10% level.
* indicates significant at 5% level.
** indicates significant at 1% level.

The full set of family background variables are jointly significant. However, the father-specific background variables are only marginally significant, while the mother-specific variables are jointly very strongly significant (Table 4.3, rows 22 - 28). The joint marginal significance level for the father's educational attainment coefficients is considerably higher than that for the mother's education variables. The only two parents' education variables that are individually highly significant are the top education categories in each case (with a +10% coefficient on the father's university completion variable and a +11% coefficient on the mother's university completion variable). The variables for the amount of time his mother worked while the respondent was growing up are jointly significant, but have oppositely-signed coefficient estimates. Mothers working 1 - 5 years have the effect of lowering earnings by 6%, while her working 6 or more years raises earnings by 4%. Generally speaking, the block of family background variables have statistically rather weak effects. Moreover, the effects of introducing this block of variables on the remaining coefficients are almost negligible.

Comparing the computed regression characteristics in panel B of Table 4.3 with the results of the last section, one notes essentially three findings. First, the returns to education are reduced with the addition of the occupation and family background variables, whereas the returns to work experience are essentially unchanged. The reductions in the returns to education are also more marked for immigrants than for native-born workers -over twenty percent for native-born, but over forty percent for foreign-born. The occupation variables likely have a stronger effect (that had been previously absorbed by education) on the earning so immigrants than native-born. Each of the three blocks of additional variables has the effect of reducing the return to education, and in each case, the reduction is greater for immigrants than for natives. Second, the age cohort effects (in rows S. - 8.) conform to exactly the same pattern as that described in the last section[27] and need not be re-analyzed here. Third, there is a slight widening of the initial foreign-born earnings differential (from 16 - 20% to 17 - 21%), no real change in the earnings gradient of immigrants with respect to years-since-immigration, and a slight lengthening of the catch-up period from 8.6 - 8.9 years to 9.9 - 10.4 years. In general, the addition of the language, occupation, and family background variables leaves essentially unchanged the adjusted mean earnings differentials between foreign-born and native-born men.

[27] The only marked change is that the widening of the separation of optimal cohort years (YRB*) for different levels of experience of native workers in the unrestricted equation (2) has been further accentuated.

V. Sample-Selectivity Adjustment for Self-Employment and Missing Data

i. Potential Sample-Selection Bias

Inherent in immigrant earnings studies where the estimation sample is a specified subset of a larger parent sample and the selectivity criterion is not purely random as between immigrant and native groups is a potential statistical selectivity problem. For example, Borjas (1986) finds that immigrants exhibit greater tendency to be self-employed than the native-born. If this is so, a sample-selection criterion that includes only paid employees in the estimation sample, and thereby excludes the predominantly self-employed, will in general impart a selectivity bias to the estimation of immigrant earnings effects.[28]

The July 1973 Job Mobility Survey is also not a regular Statistics Canada survey, but a commissioned supplementary one for which Statistics Canada undertook only limited response editing and coding checks. Consequently, there is a considerable number of non-responses to some questions, some clearly faulty coding of responses to others, and in cases where the same information has been requested in more than one question occasionally inconsistent responses or coding. It is thus not the typical "clean" micro data file one gets from Statistics Canada as a PUS Census tape or regular LFS micro data tape. One thus has to do some editing of one's own to make worthwhile use of this tape.[29] The estimation sample is defined to consist of all paid employees with positive earnings in 1972 and non-missing responses for key variables (ie., the main variables of interest that occur as regressors in the earnings function). This can be viewed as a subset of a larger parent sample which consists of all observations for men aged 25-64 for whom class-of-worker was either paid employee or self-employed, and for whom place of birth was not missing. This results in a data set of 14,374 observations. The estimation sample includes 5069 observations, or 35% of the underlying parent sample. The residual or "out sample" thus includes the 9305 records that were excluded by our sample selection criterion.

This sample selection criterion has essentially three components. First, it excludes the predominantly self-employed. This follows Borjas (1985), but differs from the studies by Chiswick (1978), Chiswick and Miller (1984, 1986) and Meng (1986), all of which include the self-employed in their estimation samples. It was felt, however, that cleaner results would be obtained by omitting this group. Indeed Borjas (1986) finds the incidence of self-employment to be higher among immigrants than among native-born, and one would expect substantial self-selection into the self-employed category (see Abbott and Beach, 1987). Second, the sample selection rule excludes all those respondents for whom positive earnings were not reported for the 1972 reference year. This is pretty standard, but it does exclude those who were either unemployed or out of the labour force for the full year, and again there may be some self-selection here; it also excludes negative self-employment income. Third, the rule excludes observations with missing values. Since these occur principally among family background and

[28] This "statistical" selectivity bias in moving from a parent sample of workers to a specified subsample should be distinguished from the "behavioral" selectivity bias of comparing workers who chose to immigrate in the first place to native-born workers who haven't (see Borjas, 1987). With a sample containing only those foreign-born who are observed to have immigrated, obviously we cannot address this latter form of selectivity bias.

[29] A full step-by-step explanation of the parent file editing procedure is available from the authors. Variables with missing values can be seen from their dummy variable indicators in the selection probit regression in the appendix.

occupation-related variables -- which may well not be reported with equal reliability for different types of workers (particularly for workers with a blue-collar family background) -- some degree of self-selection may be present. For all these reasons, then, it was felt advisable to examine and adjust for any sample-selectivity biases that might be present.

Such sample-selection or systematic censoring bias in earnings equations has been addressed by Reimers (1983) in the context of labour market discrimination among racial groups. A probit function is specified to
predict inclusion in the observed estimation sample. Reimers distinguishes between a wage-offer equation

$$LYE. = x.g + 11_1 .$$

with a white-noise error term p. and a vector of observed personal characteristics X. (for each observation i), and an observed (or 1within-estimation-sample) wage equation whose conditional mean is

$$E(LYE.I X., i \text{ in sample}) = X_i g + E(,i. i \text{ in sample}).$$

If selection into the estimation sample is not random given the observed characteristics X., then the latter term above leads to sample-selection bias. To correct for this sample-selection bias, one specifies a selectivity-adjusted sample wage equation of the form

$$LYE. = X.ft + cA + v.$$

$$1 \quad 1 \quad i \quad 1$$

where A. is the inverse Mills ratio from a sample-selection probit model and the coefficient c is interpretable as the covariance between the errors of the sample-selection probit and the wage offer equations.

The selectivity-adjustment estimation procedure ("Heckit" estimator) is now well established in the literature and will not be described in detail here. Following Heckman (1979), one first estimates by maximum likelihood on the full parent sample a probit model for selection into the estimation sample, computes the predicted value of the inverse Mills ratio for each observation in the estimation sample, and then fits by OLS to the estimation sample an earnings equation that includes as an additional regressor the inverse Mills ratio variable to capture the selectivity-bias effect.[30]

[30] For a more thorough, but easy to read, review of the econometrics involved see Maddala (1983), Ch. 9.

Regressors for the selection-probit equation include the standard human capital variables and basic controls from a simple earnings equation, dummies indicating missing observations, and various occupation controls and family background variables.[31],[32]

Estimation results for the sample selection probit are presented in appendix Table A.6. Education has a positive effect on the probability of inclusion in the estimation sample, perhaps because it reduces either or both the incidence of unemployment and the incidence of self-employment (Abbott and Beach, 1987). Greater experience (for given age and education levels) reduces the probability of sample inclusion, perhaps because of much longer average unemployment durations. Age exerts a positive effect on sample inclusion, perhaps indicating that more recent vintages faced higher unemployment rates and experienced slightly lower participation rates.[33]

Inclusion in the estimation sample is also positively correlated with having both parents present at age sixteen (a correlate of greater economic success of offspring (Beach and Finnie, 1987) and hence likely lower unemployment experience) and living in a city (where the incidence of self-employment is significantly lower (Abbott and Beach, 1987). Exclusion from the sample is more likely for foreign-born men (particularly those who are recently arrived immigrants), for those who are single and resident in Ontario, for those in relatively low-status and low-income occupations, and for those whose parents were foreign-born. Also, exclusion is more likely for individuals in primary and sales occupations (eg., fishing and farming) where one is likely to find a much higher incidence of self-employment. The correct prediction rate of the equation is 76%.

ii. Selectivity-Adjusted Earnings Equation Results

The estimation probit equation is used to compute the selection-bias adjustment variable (or inverse Mills ratio) which is added to the original earnings regressors from the last section. The new selectivity-adjusted regression results for the regressions with full background controls appear in Tables 5.1 (corresponding to the previous Table 4.1) and for the regressions with partial controls in appendix Table A.7 (corresponding to the previous Table 3.3). The selection-adjustment variable is designated as MILLSIN, and appears last in the tabulated list of regressors. The principal finding revealed by the results in Table 5.1 is the marked statistical insignificance of the selectivity-adjustment coefficient when the full set of regression controls is used. The selectivity-adjustment term is small and not remotely significant, while the individual regression coefficients in Table 5.1 differ hardly at all from the selectivity-unadjusted coefficient estimates in Table 4.1. Consequently, the regression characteristics computed from the results in Table 5.1 are virtually the same as those computed in Table 4.3 for the unadjusted results.
In the case of the earnings regressions with only limited controls, the results of selectivity-adjustment are not so clear cut. The sample-selection coefficient in Table A.7 is negative and significant (as found also by Reimers, 1983, p.574) indicating that workers with particularly high earnings opportunities for given personal characteristics perhaps face even better opportunities in the self-employment sector and hence are less likely to be observed in our estimation sample. It is apparently the absence of the set of

[31] The specification was also limited by the probit softward restrictions on the size (variables times number of observations) of estimation problem that could be handled.
[32] Definitions of variables names appearing in this equation, but not in the earlier earnings regressions, are provided in appendix Table A.S.
[33] Elsewhere (Abbott and Beach, 1987) we show that age has a positive effect on incidence of self-employment associated with a general declining trend in the incidence of self-employment, so the positive age coefficient here cannot be due to more recent vintages of workers tending more towards self-employment.

occupational control variables that accounts for the significant (and negative) selectivity coefficient, perhaps because the occupational dummies (particularly those for sales, service and primary occupations) proxy the incidence of self-employment and of extended unemployment. Inclusion of the occupational dummies in the earnings equation itself reduces the estimated selectivity coefficient to statistical insignificance, and so effectively controls for any apparent sample selectivity.[34]

[34] That the selectivity adjustment coefficient becomes non-significant when the full set of regression controls is entered should perhaps not be surprising in light of Nelson (1984) because more of the variables that enter the sample selection probit function then appear also as regressors in the earnings equation itself.

Table 5.1
Selectivity - Adjusted Regression Estimates of Log Earnings
with Full Controls
(absolute value of t-ratios in parentheses)

	(1) Limited Foreign Interactions		(2) Full Foreign Interactions	
const.	7.6269	(33.3)	7.6395	(29.0)
ED	.0300	(1.92)	.0406	(2.11)
ED2/100	.1927	(3.73)	.1629	(2.39)
EXP	.0159	(1.82)	.0244	(2.34)
EXP2/100	-.0145	(1.17)	-.0002	(0.02)
EXP. ED/100	.2246	(5.05)	.2275	(3.76)
WKS13-1.066	-1.066	(11.5)	-1.0598	(11.4)
WKS1426	-.7865	(15.6)	-.7858	(15.6)
WKS2739	-.4063	(13.6)	-.4097	(13.7)
WKS4048	-.1610	(6.68)	-.1592	(6.63)
HRSU19	-.8071	(6.33)	-.8130	(6.35)
HRSU2034	-.2001	(3.89)	-.1973	(3.90)
MHRSU	-.1056	(1.56)	-.1009	(1.49)
AGE	.0326	(2.88)	.0246	(1.89)
AGE2/100	-.0199	(1.36)	-.0028	(0.18)
ED.AGE/100	-.1682	(3.85)	-.1720	(2.92)
EXP.AGE/100	-.0395	(1.82)	-.0721	(3.30)
FB	-.8427	(3.12)	-.7157	(1.46)
FB.ED			-.0423	(1.36)
FB.ED2/100			.0804	(0.85)
FB.EXP			-.0175	(0.99)
FB.EXP2/100			-.0625	(2.05
FB.EXP.ED/100			-.1067	(1.17)
FB.AGE	.0410	(3.04)	.0582	(2.44)
FB.AGE2/100	-.0633	(3.46)	-.1075	(3.50)
FB.ED.AGE/100			.0489	(0.56)
FB.EXP.AGE/100			.1152	(2.38)
YSM	-.0026	(0.34)	-.0075	(0.67)
YSM2/l00	-.0514	(3.42)	-.0425	(2.90)
YSM.ED/100			.0619	(1.40)
YSM.EXP/100			.0098	(0.45)
YSM.AGE/100	.0714	(2.62)	.0508	(1.58)
LARGCITY	.1530	(8.78)	.1507	(8.60)
MEDCITY	.0821	(5.02)	.0804	(4.90)
ATLANTIC	-.1693	(8.84)	-.1672	(8.72)
QUEBEC	-.0271	(0.94)	-.0284	(0.97)
PRAIRIES	-.1104	(6.41)	-.1092	(6.29)
BR.COL.	.0242	(1.16)	.0266	(1.29)
MARR	.2380	(8.73)	.2378	(8.73)
OTHMS	.1684	(3.17)	.1709	(3.20)
FRENCHMT	-.0307	(1.01)	-.0266	(0.87)
OTHMT	.0207	(0.94)	.0175	(0.79)
FRJOB1	-.0698	(1.86)	-.0720	(1.91)
ENFRJOB1	-.0177	(0.57)	-.0221	(0.71)

OTHJOB1	-.0725	(1.89)	-.0922	(2.30)
FRPJOB	-.0709	(1.56)	-.0634	(1.38)
ENFRPJOB	.0366	(1.04)	.0397	(1.12)
PROFMAN	.1292	(5.84)	.1268	(5.71)
CLERIC	-.1624	(7.01)	-.1644	(7.07)
SALES	-.0161	(0.61)	-.0197	(0.75)
SERVICE	-.1692	(6.55)	-.1733	(6.74)
PRIMARY	-.0960	(2.28)	-.0985	(2.34)
CONSTR	.0416	(2.38)	.0381	(2.17)
PROFMANF	.0222	(0.68)	.0236	(0.73)
CLERICF	.0250	(0.78)	.0251	(0.78)
SALESF	.0364	(1.25)	.0379	(1.31)
SERVICEF	-.0005	(0.02)	.0005	(0.02)
PRIMARYF	.0042	(0.19)	.0036	(0.17)
CONSTRF	.0308	(1.44)	.0311	(1.46)
SOMEHSF	.0393	(1.97)	.0393	(1.98)
HSCHLF	.0408	(1.63)	.0412	(1.66)
SOMEPSF	-.0260	(0.70)	-.0276	(0.74)
PSECF	.0251	(0.85)	.0306	(1.04)
SOMEUNF	-.0061	(0.11)	-.0075	(0.13)
UNIVF	.1021	(2.24)	.1047	(2.29)
SOMEHSM	.0159	(0.85)	.0157	(0.84)
HSCHLM	.0332	(1.46)	.0325	(1.43)
SOMEPSM	-.0028	(0.05)	-.0042	(0.79)
PSECM	.0236	(0.86)	.0239	(0.88)
SOMEUNM	-.0513	(0.42)	-.0451	(0.37)
UNIVM	.1074	(2.01)	.1124	(2.10)
SOMEWKM	-.0606	(2.61)	-.0603	(2.61)
WORKEDM	.0400	(2.07)	.0382	(1.98)
MILLSIN	.0075	(0.22)	.0078	(0.23)
R2	.4972		.4991	
F	76.11		67.23	
SSR	860.46		857.24	
SER	.4147		.4143	

Note: Coefficient standard errors are based upon a White heteroscedasticity-consistent covariance matrix.

	-.0011	(0.01)	-.0626 (0.67)

Comparing individual coefficients between the adjusted and unadjusted regression with limited controls (Table A.7 vs. Table 3.3), one notes that most coefficient estimates change very little. The only noticeable differences are somewhat lower coefficients on education, MEDCITY and LARGCITY, and "missing usual hours of work" -- significant determinants, as we have seen, of the selectivity-probit regression -- and somewhat higher coefficients on YSM and the Quebec dummy variable -- again a significant determinant of the probit regression. The computed regression characteristics for the selectivity-adjusted equation end up differing not very much from those for the selectivity-unadjusted equation in Table 3.5. For example, the returns to education corresponding to rows 1 and 2 in panel B of Table 3.5 have selectivity-adjusted values of .056, .058, and .047, and .066, .069, and .055 -- all within a single point of their previous (unadjusted) values. Similarly, the estimated returns to work experience corresponding to rows 3 and 4 are .032, .034, and .025, and .021, .023, and .015 -- again very close to their previous values. The age cohort effects in rows 5 and 6 do change a bit as a result of the selectivity adjustment: .0009, .0108, -.0011, and .0147 for row 5 and -0.0115, -.0108, -.0131, and -.0067 for row 6, but the same general pattern emerges. With respect to the foreign-born earnings differentials, the initial earnings gap for the first equation is reduced from 19.6 - 19.8% to 16.6 - 16.9%, and for the second equation is reduced from 16.4 - 17.7% to 13.7 - 14.8%. However, the slope of the YSM curve is flattened slightly to .010 - .014 for the first equation and to .009 - .011 for the second. The eventual cross-over value of YSM is reduced to 8.11 and 7.74 years respectively (i.e., reduced by less than a year) -- hardly dramatic changes. In summary, then, sample selection bias does not appear to be at all severe in the present case. Since the sample selection rule used here involves a somewhat greater degree of sample exclusion than that conventionally incorporated in studies of male immigrant earnings differentials, the above results suggest that standard sample-selection rules used in male immigrant earnings studies do not appear to unduly bias the major conventional findings.

VI. Concluding Remarks

This paper has examined what has happened to immigrant earnings differentials in Canada leading up to the 1970's. The 1973 Job Mobility Survey used in the analysis has a direct measure of work experience, so that the age variable (controlling for experience) becomes vintage or birth cohort indicator for workers. It is found that earnings differentials for foreign- born men vis-a-vis native-born men have been widening since the mid to late 1960's. Similar experience in the U.S. has given rise to two alternative hypotheses concerning the source of this widening differential; one, by Borjas, focuses on a flattening of the earnings profiles of foreign-born workers due to reduced immigrant quality; the other, by Chiswick, emphasizes a steepening of domestic earnings profiles and widening domestic skill differentials so that recent immigrants who are relatively lacking in North American labour market familiarity and skills face a bigger earnings gap to overcome.

Investigation of the separate age (and immigrant) cohort effects in the earnings of native- and foreign-born workers reveals three distinct sources of the widening differentials in the Canadian case. First, a steepening of earnings profiles for native-born workers, consistent with Chiswick's results for the U.S., is indeed found, so that recent immigrants face a greater earnings gap than formerly to overcome. Second, the years-since-migration (YSM) earnings profile of foreign-born has indeed become flatter, consistent with Borjas' finding for the U.S., so that recent immigrants can move to catch up to the natives only at a slower rate than formerly. And third, it is found that the experience-earnings profile of immigrants has been flattening out as well, further slowing up their efforts to overtake the earnings of native-born workers. The timing of the changed cohort effects for foreign-born suggests several possible explanations that are discussed. Current evidence, however, cannot discriminate among these alternative explanations, and clearly further research efforts need to be undertaken to do so.

When an extensive set of family background variables and labour market controls are added, language is found to have significant effects on earnings. But it is essentially language proficiency on the job rather than mother tongue that counts.

Potential sample selection bias is also examined in the conventional selection of estimation samples for male immigrant earnings analyses. It is found that sample selection bias does not appear at all severe. Since the sample selection rule used here is somewhat tighter than often used, this finding suggests that empirical studies of male immigrant earnings differentials that do not correct for sample censoring are unlikely to be affected by significant sample selection biases.

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Table A.1

Percentage Distribution of Canadian Immigrants by Source Region, 1951-1969

	1951-57	1958-61	1962-69
Developed Countries			
United Kingdom	29.9%	19.1%	26.4%
Northern and Western Europe	34.8	23.8	15.0
United States	5.5	11.0	11.0
Australasia	0.9	1.7	2.3
Other Europe	14.2	22.4	15.5
TOTAL	85.2	78.0	70.2
Less-Developed Countries			
Europe	2.6	8.4	9.1
Latin America	1.3	2.4	4.6
Middle East	0.8	1.4	2.4
Asia	1.5	2.5	6.0
Africa	0.3	0.5	0.8
Other	8.3	6.8	6.8
TOTAL	14.8	22.0	29.8

Source: Green (1976), Table 4.2.

Table A.2

Percentage Distribution of Canadian Immigration
by Major Occupational Groups 1951-1969

	1951-57	1958-61	1962-69
White-Collar Workers			
Managerial	1.88	1.71	2.53
Professional	8.93	13.97	25.69
Clerical	8.44	10.88	13.68
Commercial & Financial	2.85	3.77	3.35
Total	22.10	30.33	45.25
Blue-Collar Workers			
Manufacturing	20.54	16.99	23.08
Construction	9.51	8.33	8.47
Labourers (excl. primary)	15.29	14.53	6.64
Total	45.34	39.85	38.19
Primary Workers			
Farmers & Farm Laborers	14.16	8.63	3.39
Fishing & Hunting	0.04	0.04	0.05
Logging	1.17	0.22	0.15
Mining	1.16	0.57	0.36
Total	16.53	9.46	0.95
Transportation & Communications	1.89	1.96	1.47
Service & Recreational Workers	14.13	18.40	11.14
TOTAL	100	100	100

Source: Green (1976), Table 5-3.

Table A.4

Percentage Breakdown of Canadian Immigration Flows 1923-85
and of Immigrant Cohorts in the Foreign-Born Sample

Year of Arrival in Canada	Canadian Immigration Flows (1)	Cohort Sizes in the Foreign-Born Sample	
		Full FB Sample (2)	Cohorts after 1922 (3)
Before 1923		3.73%	
1923-27	13.93%	3.37	3.50%
1928-32	9.91	2.89	3.00
1933-37	1.33	1.08	1.12
1938-42	1.28	0.96	1.00
1943-47	3.68	4.22	4.38
1948-52	13.36	20.10	20.88
1953-57	16.76	22.26	23.12
1958-62	9.86	10.23	10.63
1963-67	15.74	16.49	17.13
1968-72	15.07	14.68	15.25

Source: Colum (1) figures from Table 2.1.
Colum (2) figures from Foreign-Born Sample (N = 831).
Colum (3) figures are computed from col. (2) figures divided by (1-.0373).

Table A.5

Additional Variables Appearing in the Selection-Profit Regression

MED	Dummy variables indicating missing response to variable ED.
MEXP	Dummy variables indicating missing response to variable EXP.
AGE	Age of respondent at time of interview.
APRENT	Dummy variable indicating respondent has completed an apprenticeship
MAPRENT	Dummy variable indicating missing response to variable APRENT.
MWEEKS	Dummy variable indicating missing response to variable WEEKS
HRSU2034	Dummy variable indicating usual hours of work in 1972 were 20-23 hours per week
HRSU19	Dummy variable indicating usual hours of work in 1972 were less than 20 hours per week.
MHRSU	Dummy variable indicating missing response to variable for number of hours per week usually worked in 1972
MOCC	Dummy variable indicating missing response to variable designating respondent's occupation
CLSFSELF	Dummy variable indicating the class of worker of respondent's father was self-employed
MCLSF	Dummy variable indicating missing response to variable describing the class-of-worker status of respondent's father.
BPAR16	Dummy variable indicating both parents were living with the respondent when he was age 16.
MPAR16	Dummy variable indicating missing response to variable BPAR16.
FBORNF	Dummy variable indicating father was foreign-born.
MBORNF	Dummy variable indicating missing response to variable FBORNF.
FBORNM	Dummy variable indicating mother was foreign-born.
MBORNM	Dummy variable indicating missing response to variable FBORNM.

Table A.6

Selection-Probit Regression for Inclusion in Estimation Sample

(absolute value of t-ratios in parentheses)

const.	-1.0019	(3.72)
ED	.1309	(5.63)
$ED^2/100$	-.6180	(7.87)
EXP	-.0207	(2.74)
$EXP^2/100$	.0057	(0.55)
EXPoED/100	-.2221	(5.69)
MED	-6.056	(0.10)
MEXP	-7.169	(0.15)
AGE	.0340	(12.6)
APRENT	-.0424	(1.34)
MPRENT	-.1378	(3.18)
In (Weeks)	-.0596	(1.36)
MWEEKS	-6.472	(0.11)
HRSU2034	-.2159	(2.62)
HRSU19	-.0998	(0.59)
MHRSU	-.4079	(3.69)
FB	-.6309	(3.62)
YSM	.0431	(6.36)
$YSM^2/100$	-.0645	(5.09)
FB@	.1990	(1.41)
FB3	.1259	(0.83)
LARGCITY	.2016	(5.41)
MEDCITY	.2248	(6.27)
ATLANTIC	.0770	(1.80)
QUEBEC	.2326	(5.76)
PRAIRIES	.0555	(1.37)
BR. COL.	.1900	(4.19)
MARR	.0803	(1.61)
OTHMS	.1707	(1.66)
PROFMAN	.0830	(1.55)
CLERIC	.0803	(1.23)
SALES	-.2214	(4.03)
SERVICE	-.1175	(1.89)
PRIMARY	-.9137	(15.4)
CONSTR	-.0862	(1.95)
MOCC	-6.433	(0.13)
CLSFSELF	-.0876	(2.68)
MCLSF	-.6317	(18.5)
BPAR16	.3246	(8.87)
MPAR16	-.6265	(2.45)
FBORNF	-.0831	(1.94)
MBORNF	-.5561	(4.44)
FBORNM	-.1291	(2.92)
MBORNM	-.2392	(2.96)

R^2 (Maddala) = .352

R^2 (Cragg-Uhler) = .484

R^2 (McFadden) = .334

R^2 (Chow) = .662

LR test (43 d.f.) = 6227.

Prediction Success Table

	Actual	
Predicted	0	1
0	7325	1449
1	1980	3620

Number of Right Predictions = 10.946 Percent of Right Predictions = 76.14

Table A.7

Selectivity-Adjusted Regression Estimates of Log Earnings
with Limited Controls

(absolute value of t-ratios in parenthesis)

	(1) Limited Foreign Interactions		(2) Full Foreign Interactions	
const.	7.6254	(32.9)	7.6915	(29.1)
ED	.0279	(1.78)	.0346	(1.84)
$ED^2/100$	.2746	(5.57)	.2516	(3.82)
EXP	.0156	(1.71)	.0252	(2.32)
$EXP^2/100$	-.0161	(1.22)	-.0005	(0.04)'
EXP. ED/100	.2451	(5.49)	.2454	(3.89)
WKS13	-1.0747	(11.4)	-1.0685	(11.2)
WKS1426	-.8061	(15.7)	-.8056	(15.7)
WKS2739	-.4119	(13.6)	-.4161	(13.7)
WKS4048	-.1580	(6.37)	-.1564	(6.32)
HRSU19	-.8126	(6.06)	-.8154	(6.06)
HRSU2034	-.1993	(3.74)	-.1948	(3.72)
MHRSU	-.0706	(1.06)	-.0652	(0.98)
AGE	.0338	(2.91)	.0238	(1.77)
$AGE^2/100$	-.0228	(1.49)	-.0040	(0.25)
ED.AGE/100	-.1784	(4.06)	-.1752	(2.85)
EXP.AGE/100	-.0367	(1.57)	-.0720	(3.09)
FB	-.8335	(2.98)	-.9708	(1.87)
FB.ED			-.0228	(0.70)
$FB.ED^2/100$			.0441	(0.46)
FB. EXP			-.0222	(1.21)

FB.EXP^2/100				-.0685	(2.17)
FB.EXP.ED/100				-.1018	(1.09)
FB.AGE		.0435	(3.11)	.0685	(2.77)
FB.ED.AGE/100				.0266	(0.30)
FB.EXP.AGE/100				.1253	(2.54)
YSM	-.0045		(0.57)	-.0075	(0.64)
YSM^2/100	-.0495		(3.25)	-.0406	(2.73)
YSM.ED/100				.0570	(1.23)
YSM.EXP/100				.0157	(0.71)
YSM.AGE/100	.0735		(2.61)	.0475	(1.45)
LARGCITY	.1591		(9.16)	.1562	(8.91)
MEDCITY	.0705		(4.25)	.0689	(4.15)
ATLANTIC	-.1684		(8.68)	-.1664	(8.56)
QUEBEC	-.1131		(6.18)	-.1094	(5.94)
PRAIRIES	-.1061		(6.19)	-.1055	(6.13)
BR.COL.	.0176		(0.84)	.0199	(0.95)
MARR	.2497		(8.97)	.2491	(8.93)
OTHMS	.1658		(2.96)	.1680	(2.99)
MILLSIN	-.0730		(2.55)	-.0744	(2.60)
R^2		.4657		.4675	
F		141.60		110.38	
SSR		914.40		911.17	
SER		.4261		.4257	

Note: Coefficient standard errors are based upon a White heteroscedasticity-consistent covariance matrix.

Table A.8

Unpooled Regressions of Log Earnings for Native- and Foreign-Born with Limited Controls (Corresponding to Table 3.3(2))*

(absolute value of t-ratios in parentheses)

	(1) Native-Born Base		(2) Foreign-Born Difference	
ED	.0396	(2.73)	-.0182	(0.64)
$ED^2/100$	.2353	(4.56)	.0085	(0.10)
EXP	.0228	(2.52)	-.0242	(1.39)
$EXP^2/100$	-.0021	(0.17)	-.0655	(2.47)
EXP.ED/100	.2409	(4.99)	-.1105	(1.33)
AGE	.0264	(2.39)	.0681	(2.99)
$AGE^2/100$	-.0055	(0.38)	-.1176	(3.88)
ED. AGE/100	-.1809	(3.92)	.0364	(0.48)
EXP.AGE/100	-.0681	(3.14)	.1287	(3.01)
WKS13	-1.1531	(20.6)	.3679	(3.19)
WKS1426	-.7530	(19.9)	-.3408	(3.69)
WKS2739	-.4162	(14.5)	.0026	(0.03)
WK54048	-.1538	(6.00)	-.0343	(0.54)
HRSU19	-.8570	(10.1)	.3655	(1.82)
HRSU2034	-.2185	(5.01)	.0724	(0.70)
MHRSU	-.1214	(1.88)	.1758	(1.24)
LARGCITY	.1766	(9.86)	-.1043	(1.98)
MEDCITY	.0899	(5.33)	-.0997	(1.69)
ATLANTIC	-.1640	(7.97)	.0517	(0.54)
QUEBEC	-.1080	(5.53)	.0946	(1.86)
PRAIRIES	-.1122	(5.48)	.0336	(0.68)

BR. COL.	.0459	(1.91)	-.1100	(2.28)
MARR	.2496	(10.0)	.0003	(0.01)
OTHMS	.1450	(2.87)	.1099	(0.92)
const/FB	7.5688	(37.3)	-.9275	(2.11)
YSM			-.0036	(0.40)
$YSM^2/100$			-.0419	(3.62)
YSM.ED/100			.0599	(1.42)
YSM.EXP/100			.0137	(0.79)
YSM. AGE/100			.0410	(1.69)
NOBS	4238		831	
	R^2 = .4715 F = 82.85			
	SSR = 904.35 SER = .4247			

*Note: The separate regression results are here presented in terms of the native-born sample coefficients being treated as the "base case" results and the foreign-born sample coefficients being treated as the difference or increment to the base coefficients. The coefficients for a separate foreign-born regression are then obviously obtained by summing the corresponding base and increment coefficients reported here. The F-statistic for a test of the zero restrictions implicit in Table 3.3(2) vs. the above results in 3.02 which is significant at the 99% level of confidence.

Table A.9

Unpooled Regressions of Log Earnings for Native- and Foreign-Born with Full Controls (Corresponding to Table 4.1(2))*

(absolute value of t-ratios in parentheses)

	(1) Native-Born Base		(2) Foreign-Born Difference	
ED	.0372	(2.55)	-.0491	(1.65)
$ED^2/100$	.1847	(3.54)	.0250	(0.28)
EXP	.0230	(2.60)	-.0238	(1.37)
$EXP^2/100$	-.0014	(0.12)	-.0673	(2.56)
EXP. ED/100	.2350	(4.94)	-.1245	(1.50)
AGE	.0253	(2.33)	.0589	(2.58)
$AGE^2/100$	-.0040	(0.28)	-.1131	(3.72)
ED.AGE/100	-.1747	(3.85)	.0817	(1.06)
EXP.AGE/100	-.0693	(3.27)	.1348	(3.16)
WKS13	-1.1414	(20.9)	.3870	(3.35)
WKS1426	-.7353	(19.8)	-.3057	(3.30)
WKS2739	-.4072	(14.5)	.0241	(0.32)
WKS4048	-.1540	(6.12)	-.0204	(0.32)
HRSU19	-.8463	(10.2)	.2916	(1.45)
HRSU2034	-.2121	(4.95)	.0863	(0.83)
MHRSU	-.1350	(2.14)	.1999	(1.43)
LARGCITY	.1607	(8.84)	-.1012	(1.92)
MEDCITY	.0887	(5.31)	-.1028	(1.76)
ATLANTIC	-.1629	(8.03)	.0157	(0.16)
QUEBEC	-.0237	(0.77)	-.0330	(0.47)
PRAIRIES	-.1144	(5.52)	.0291	(0.59)
BR.COL.	.0491	(2.07)	-.0988	(2.05)

MARR	.2331	(9.54)	.0041	(0.06)
OTHMS	.1327	(2.68)	.1348	(1.13)
FRENCHMT	-.0386	(1.13)	.0405	(0.41)
OTHMT	.0334	(1.19)	-.0477	(0.95)
FRJOB1	-.0612	(1.42)	.0404	(0.31)
ENFRJOB1	-.0135	(0.35)	.0267	(0.31)
OTHJOB1	.0233	(0.13)	-.0829	(0.45)
FRPJOB	-.0644	(1.33)	-.1071	(0.65)
ENFRPJOB	.0364	(0.90)	.0036	(0.04)
OTHPJOB	-.5070	(1.65)	.4645	(1.45)
PROFMAN	.1113	(4.44)	.0369	(0.53)
CLERIC	-.1649	(5.69)	-.0441	(0.51)
SALES	-.0132	(0.50)	-.0882	(1.10)
SERVICE	-.1568	(5.33)	-.1049	(1.33)
PRIMARY	-.0860	(2.67)	-.0968	(0.98)
CONSTR	.0477	(2.36)	-.0888	(1.48)
PROFMANF	.0340	(0.97)	-.1582	(1.73)
CLERICF	.0279	(0.69)	-.1173	(1.12)
SALESF	.0619	(2.01)	-.2155	(2.46)
SERVICEF	.0123	(0.38)	-.1291	(1.42)
PRIMARYF	.0162	(0.68)	-.1445	(1.88)
CONSTRF	.0455	(1.93)	-.1567	(2.08)
SOMEHSF	.0367	(1.67)	.0150	(0.22)
HSCHLF	.0327	(1.20)	.0461	(0.65)
SOMEPSF	.0002	(0.00)	-.2058	(1.80)
PSECF	.0290	(0.81)	.0241	(0.31)
SOMEUNF	-.0046	(0.07)	-.0048	(0.03)

UNIVF	.0599	(1.28)	.1452	(1.51)
SOMEHSM	.0140	(0.66)	-.0008	(0.01)
HSCHLM	.0306	(1.23)	-.0145	(0.21)
SOMEPSM	.0009	(0.02)	-.1065	(0.70)
PSECM	.0284	(0.93)	-.0319	(0.39)
SOMEUNM	.0189	(0.19)	-.2117	(1.11)
UNIVM	.0833	(1.32)	.0549	(0.42)
SOMEWKM	-.0712	(2.53)	.0454	(0.67)
WORKEDM	.0318	(1.29)	.0301	(0.59)
const/FB	7.6345	(37.9)	-.3411	(0.76)
YSM			-.0044	(0.47)
$YSM^2/100$			-.0409	(3.48)
YSM.ED/100			.0525	(1.21)
YSM.EXP/100			.0052	(0.30)
YSM.AGE/100			.0459	(1.90)
NOBS	4238		831	
	R^2 = .5062 F = 41.56			
	SSR = 845.03 SER = .4133			

*Note: The separate regression results are being presented in terms of the native-born sample coefficients being treated as the "base case" results and the foreign-born sample coefficients being treated as the difference or increment to the base coefficients. The coefficients for a separate foreign-born regression are then obviously obtained by summing the corresponding base and increment coefficients reported here. The F-statistic for a test of the zero restrictions implicit in Table 4.1(2) vs. the above results is 1.46 which is significant at the 95%, but not at the 99%, level of confidence.

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