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WEALTH ACCUMULATION OF CANADIAN AND FOREIGN-BORN HOUSEHOLDS IN CANADA

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ABSTRACT

This study focuses on the role of foreign-born households in Canada's asset market. An empirical analysis of wealth accumulation is conducted for a large sample of Canadian households *circa* 1977-1984. This study period reflects a change in Canada's immigration policy which resulted in immigration flows switching from Europe to Asia. A life-cycle framework is used to examine wealth accumulation behaviour of the foreign-born *vis-à-vis* Canadian-born households. The empirical results confirm the existence of an inverted 'U'-shaped wealth-age profile for both Canadian and immigrant households. However, the 1977 results show that the rate of wealth accumulation is higher for the immigrant household than the Canadian-born household in pre-retirement years, while the 1984 results reveal the opposite. After retirement in both 1977 and 1984, the rate of wealth dissipation is slower for Canadians than for foreign-born households. Only the 1984 results indicate that public social security wealth displaces household savings for both the Canadian-born and the foreign-born by a small amount. Finally, an immigrant household exhibits a stronger transfer motive within a family than a Canadian-born household regardless of year tested.

1. INTRODUCTION

Given that the post-1977 rise in Canada's immigration intake was partially predicated on the presumption that immigrants could help raise Canada's relatively low private savings rate, this paper investigates the potentially differential wealth accumulation behaviour of Canadian- and foreign-born households.[1] The impact of old age social security programs on the savings behaviour of both Canadian- and the foreign-born households is also evaluated. In general, previous immigration research has focused on the immigrants' labour market performance and hence ignored the role of immigrants in the capital market (see DeVoretz 1993). The present study intends to fill this gap in the literature.

There exist *a priori* reasons to believe that foreign-born savings behaviour may differ from that of the Canadian-born. First, immigrants are not a random sample drawn from abroad. Indeed, the foreign-born are doubly selected. At the first stage, immigrants self select and participate in a worldwide immigration market. At the second stage, from this pool of self-selected agents Canada selects immigrants partially based on

[1]Canada's aggregate savings rate averaged 20.7% in the 1980s down from 23% in the 1970s. The household sector is the principle source of Canadian savings (12.5%). Over the last three decades, the corporate savings rate has remained stable (8.5%) while public savings became negative and private household savings rose (Source: OECD National Income Accounts, Compiled by Shafer, Elmeskov and Tease, 1992).

labour market and demographic criteria. Thus, given these economic entry criteria, the income performance and hence household intertemporal budget restraint may differ in Canada by birthplace. Second, some immigrants have limited access to Canada's federal old age security (OAS) pension since entitlement to OAS pension is linked to age and residency (see Appendix) and not means tested. This public pension represents a unique non-marketable indexed annuity that has no close substitute in the private annuity market. This differential access to Canada's old age social security program imposes a different constraint on the wealth accumulation decisions of immigrants *vis-à-vis* Canadian-born households. Third, Canada's immigration policy changed over the study period with source countries moving from Europe to Asia. Thus, the tastes, preferences and cultural and economic backgrounds of immigrants have become increasingly diverse from the Canadian-born population and this in turn may yield differential saving propensities by birthplace.

2. LITERATURE SURVEY

Explanations for household savings have a long history in the literature with one dominant strain arguing that households use capital markets to smooth consumption over their life cycle. This theory suggests that despite large fluctuations in disposable income, the level of consumption remains reasonably stable over an individual's lifetime. On the other hand, human-capital theory suggests that a typical individual's age-income profile

follows an inverted U-pattern. This income and consumption behaviour together imply a hump-shaped wealth-age profile. Even in the absence of a quadratic earnings profile, wealth accumulation will follow an inverted U-pattern as long as labor income ceases at retirement.

Support for the U-shaped wealth-age profile in Canada is provided by Burbidge and Robb (BR 1985) who investigated the asset accumulation behaviour of major household groups in Canada (blue-collar versus white-collar) using 1977 consumer finance data. Their results suggest that an inverted U-shaped wealth-age profile exists in general. However, they note that "blue-collar" households dissave after retirement, while "white-collar" households do not.

An alternative method to explain household wealth holdings is to analyze the underlying consumption-age profiles. The general premise of an upward-sloping consumption-age profile and consequently dissaving in retirement (Auerbach and Kotlikoff 1987) is not, however, supported by two recent Canadian studies. Robb and Burbidge (1989) found that consumption-age profiles were downward sloping late in the life cycle. Using Family Expenditure Survey data (1979, 1983, 1984), Marr and McCready (1989) also found a sharp decrease in consumer spending on all items and an increase in savings for the over-age-65 cohort.

Feldstein's studies (1974, 1977) analyze the impact of social security benefits on private savings. He argued that social security resulted in a "wealth replacement effect" and a countervailing "induced retirement effect." The former infers that social security reduces private wealth accumulation by providing income during retirement. A

countervailing effect of social security arises from the possibility that social security, by providing non-labour income, induces the elderly to reduce their labour supply. If an individual perfectly anticipates this reduction in labour supply, wealth accumulation over his/her working life span will increase. Thus, the net effect of a social security program on private net worth is theoretically indeterminate. Feldstein's (1974) empirical results indicate that a dollar increase in gross social security wealth (SSW) raised the aggregate consumption in the United States by two cents which implies a fall in savings, *ceteris paribus*.

Boyle and Murray (1979) estimated a Feldstein-type model to measure with time series data the net impact of the Canada Pension Plan on Canadian household savings. They report no statistically significant effect of Canada's public pension plans on household savings. Finally, King and Dicks-Mireaux (KDM 1982) examined the interaction of social security wealth and private wealth-age profiles with Canadian cross-sectional data (1977). The KDM study reported: (i) an inverted U-shaped wealth-age profile with a slow rate of wealth dissipation in retirement; and (ii) that social security and pension benefits reduce household savings, *ceteris paribus*.

In sum, the Canadian work to date provides empirical support for a qualified version of the life-cycle model of accumulation, which recognizes the impact of uncertain life-span and the presence of a transfer motive.

3. CONCEPTUAL FRAMEWORK

This section presents a conceptual framework to explain differential immigrant- and Canadian-born household wealth accumulation behaviour. More specifically, we first identify factors that determine household wealth accumulation and then argue that both the endowment of these factors and an individual household's savings response to these factors may differ by birth-place.

The pure life-cycle model signifies the importance of wealth accumulation during working life-span for consumption during retirement. This postulated lifetime savings pattern may vary across households due to differences in age, initial asset holdings, magnitude of earning streams, time preferences (or tastes), and the size and composition of household. However, a feature common to all household accumulation profiles is the proposition that "[W]ealth must clearly be declining after retirement, and at a sufficiently fast pace to reach exhaustion at the end of life (Modigliani, 1988: 23)." We have noted above contrary evidence to this prediction in some Canadian and U.S. cross-section studies (see last section) that reveals a very slow rate of wealth dissipation for the elderly.

Given this crucial shortcoming of terminal wealth dissipation, attempts have been made to extend the life-cycle model in three key directions to produce more realistic predictions. These extensions include: the incorporation of public annuities in the household budget constraint (Feldstein, 1974, 1977); recognition of a transfer motive (bequests and *inter vivo* transfers) within the family (e.g., Blinder 1973) and the inclusion mortality risk in the model (e.g., Davies 1981, and Hurd 1989).

Feldstein provides us with a framework to analyze whether or not the impact of Canada's social security wealth on private wealth accumulation differs by birthplace. An obvious implication of the pure life-cycle model is that, by providing income during retirement life span, an actuarially fair social security program reduces private wealth accumulation. Put differently, a wealth-replacement effect arises under an actuarially fair social security program as the household substitutes dollar-for-dollar public-for-private capital. On the other hand, social security, which provides income to the aged, reduces labour supply during retirement. A further reduction in labour supply may occur if the magnitude of social security benefits depends on an earnings test. This test reduces labour supply of the aged by imposing an implicit tax on their earnings. If this reduction in labour supply over the late stage of the life cycle is correctly anticipated by workers, private savings during the pre-retirement life span may increase Feldstein termed this the "induced retirement effect." The net effect of old age social security on private wealth is theoretically indeterminate because the induced retirement effect operates in an opposite direction to the wealth replacement effect.

Blinder (1973) modified the life-cycle theory of accumulation by including a transfer or bequest motive to help explain the slow rate of wealth dissipation for the elderly. One likely outcome of this model is presented in Figure 1. The optimal consumption, $C^*(L)$ depends on the household's lifetime resources net of present value of desired bequests. $C^*(L)$ is upward sloping in the stage of life cycle (L) if the household's subjective time rate of discount is smaller than the market interest rate. The corresponding wealth-age profile is likely to be an inverted-U shaped providing that

initial wealth (b_0) is not large and/or earnings (E) cease at retirement (N). The desired bequests in this model are an increasing function of lifetime resources and the marginal utility from bequests.

Uncertainty over time of death or mortality risk will also affect the rate of wealth dissipation. Hurd (1989) provides a model, under which individuals derive utility from consumption and bequests under an uncertain date of death.[2] In general, an increase in mortality risk increases present consumption at the expense of future consumption, given some degree of risk aversion to mortality.[3] In sum, Hurd provides two theoretically relevant findings for this paper: (i) the wealth-age profile for the elderly is downward sloping unless initial wealth is too large, and (ii) the introduction of a bequest motive makes the wealth-age profile flatter over the retirement life.

(INSERT FIGURE 1)

Implications for Wealth Accumulation Profiles of Immigrants vis-à-vis Canadian-Born Households

[2] Households finance their consumption and bequests from non-labour income flowing from initial wealth (net worth at the beginning of the planning period) and exogenously given annuities which can not be used as collateral for borrowing. The latter imposes a boundary condition on the desired paths of consumption and wealth. Another important determinant of those paths is the mortality risk.

[3] Hurd (1989) observes a moderate degree of mortality risk aversion from the US Longitudinal Retirement History Survey. He also finds a small marginal utility from bequest, implying a small amount of desired bequests. Thus, most bequests are accidental - an outcome of mortality risk.

The above conceptual framework implies that the optimal wealth holdings of immigrants may differ from those of the Canadian-born due to the following basic reasons:

(i) differences in the endowment of household characteristics such as lifetime resources (inheritance, earnings profile and annuities), the stage in the household's life cycle and mortality risk; and

(ii) differences in household tastes and preferences, which are crucial in determining the sensitivity of wealth accumulation with respect to each of the above observed factors, and

(iii) differences in eligibility to Canada's publicly financed social security programs.

We expand on the explanations of these differential features below. Household lifetime resources depend mainly on inheritance or initial assets, their earning profile and annuities. Each of these elements may differ by birth status.

First, given that immigrants are by definition a first generation resident population in Canada, their inheritance or initial assets at the beginning of Canadian economic life will be lower than the Canadian-born population.[4]

Second, unlike the Canadian-born population, the foreign-born population has limited access to one component of Canada's social security program due to the existence of a residency test. The old age social security system in Canada includes three key programs: the Canada/Quebec pension plan (CPP/QPP), Old Age Security Pension (OAS), Guaranteed Income Supplements (GIS) and Spouse Allowance (SPA). The

[4] This argument may not hold for the foreign-born population who entered Canada as children and then formed households.

CPP/QPP is a mandatory public pension program for all workers which provides an annuity based on the earnings history of the individual; the OAS pension is subject to the age and residency test; the GIS provides benefits to OAS eligible pensioners subject to a means test, and finally, the SPA benefit is also means tested and targeted to the spouse (aged 60-65 years) of a pensioner. Thus, overall entitlement to social security benefits depends on age, years of residence in Canada, household characteristics (e.g., spouse's age), income and social security rules. Due to the residency test, an immigrant may receive little or no OAS pension.[5]

A third differential force impacts on the foreign-born population uniquely in the form of a *transitional effect*. Most immigrants enter Canada either at the last stage of their schooling period or after the completion of formal education (Coulson and DeVoretz 1993) but they continue to invest in order to acquire further human capital that is *specific* to the Canadian labour market (e.g., language proficiency, formal education, vocational training, firm-specific training etc.). Thus, the earnings profile of a typical immigrant will initially fall short but ultimately catch up the earnings profile of a typical Canadian born.[6] In spite of initial low earnings, an immigrant usually spends a large fraction of this income on consumer durables at the early stage of his/her Canadian life cycle. Consequently, the wealth accumulation profile of an immigrant household is likely

[5] The implications of the residency test for OAS are the following: immigrants who arrived in Canada at age 25 or less will be entitled to full OAS benefits; immigrants, who arrived in Canada between ages 26 and 55 will be entitled to partial OAS benefits; and immigrants who arrived in Canada after age 55 will not be entitled to OAS benefits. See the Appendix for further details.

[6] Qualifying this human capital interpretation is the claim that individual earnings are not only a function of an individual's human capital endowment, but also of characteristics that are attributed (rightly or wrongly) to the ethnic group to which they belong.

to lie below that of a comparable Canadian-born household at the initial stage of settlement.

Fourth, in addition to the pure *transitional effect*, a persistent difference in wealth accumulation between the foreign- and Canadian-born households arises from the double selection of immigrants (see Section 1) and the resulting differential unobserved skills and innate abilities between foreign-born *vis-à-vis* the Canadian-born.

Finally, the accumulation profile will vary by birth status if the foreign-born household possesses a different rate of time preference, greater (or less) mortality risk aversion and varying tastes for *inter vivo* versus end of life transfer (bequests). For example, it is widely believed that immigrants originating from Asian countries have a stronger preference than the Canadian-born for intergenerational transfers within the extended family unit. Thus, these immigrants may exhibit a different accumulation profile, *ceteris paribus*, to achieve their transfer goal at the end of their lives.

These differential characteristics of the foreign-born population are reinforced by major post-1967 Canadian immigration policy changes. In 1967, Canada introduced a points system (based on education, occupation, experience, age etc.), which replaced 'country of origin' as a selection criterion and later (post-1977) relaxed family reunification rules. Table 1 illustrates the effect of these policy changes as Canada's immigrant intake shifted from Western Europe to Asia.[7] Two fundamental changes resulted from the policy shift after 1976: first, immigrant-source countries shifted. For

[7] The data set used for econometric analysis does not contain information on ethnic origin or country of birth. Thus, extraneous information based on the 1986 Census family file are presented in Table 1.

example, the 1978-86 immigrant flow from Asia and other underdeveloped countries constituted 49 percent of Canada's arrivals. This portion was only 5.5 percent of arrivals prior to 1967. Secondly, the ethnic composition of Canada's foreign-born population differed significantly from that of the Canadian-born population by 1986. Ethnic Asians constituted 16.6 percent of Canada's foreign-born population and only 0.3 percent of the Canadian-born population. These changes in source countries by level of development and ethnic mix imply differences in taste and preferences and possibly differential wealth accumulation rates by birthplace.

(INSERT TABLE 1)

4. EMPIRICAL SPECIFICATION AND THE DATA

The Empirical Model

The conceptual framework presented in the last section suggests that desired wealth holding depends on lifetime earnings, age, the interest rate and preference parameters. The study uses 1977 and 1984 Survey of Consumer Finance (SCF) data to estimate the parameters of the empirical model.[8] Given that this study uses cross-sectional data, it is

[8] We are of the opinion that the Survey of Consumer Finance is a better data source than the Family Expenditure Survey (FAMEX) to conduct an analysis of household wealth accumulation. The reasons for the choice of the SCF data are the following. First, it is widely believed that income is subject to under-reporting and expenditure is subject to over-reporting. Hence, a residual saving will be highly under-estimated if the FAMEX data are employed. Indeed, the study by Marr and McCready (1989), which uses FAMEX data, observed negative savings for most family types and age groups. Although we recognize the existence of measurement errors in the asset data, no adjustment has been made because any type of adjustment to the micro data based on aggregate household sector portfolio would be arbitrary. There exists an *a priori* reason to believe that measurement error in private net worth is uncorrelated with the birthplace. Since there is no motivation for the foreign-born to understate their

impossible to estimate the interest rate effect because all sample members face a uniform market rate. Furthermore, lifetime earnings can only be computed from the earnings history of an individual over his/her life cycle. Hence, an estimate of the household's normal earnings is used to capture the effect of lifetime earnings on desired household wealth holding.[9] With respect to the transfer motive, an earlier theoretical analysis (see Shamsuddin 1993) suggests that the desired transfer wealth is a proportion of lifetime resources where the proportion varies with the length of life, tastes and the interest rate. The most important determinant of the taste for transfer wealth has been argued to be the number of children. Blinder *et al.* (1983) expressed desired transfer wealth as a quadratic function of the number of children. They hypothesized that transfer wealth increases at a decreasing rate as the number of children increases. The present study adopts this specification since both the life cycle and the transfer motives are competing for lifetime resources.

Theoretically, household wealth can be partitioned into life-cycle wealth (W_L) and intergenerational transfer wealth (W_B). Households are not asked to declare wealth holdings by accumulation motives in the data set used (SCF). Hence, it is not possible to estimate a separate transfer wealth function using this data set. Since the dependent variable we intend to explain includes assets held for both life-cycle and transfer motives, the wealth equation must include determinants of both W_L and W_B. Moreover, social

wealth by a larger fraction than that of the Canadian-born given that the government tax system does not discriminate residents by their birthplace.

[9]Feldstein and Pellechio (1979) used average income for two consecutive years as a proxy for average lifetime earnings. The estimation procedure used in this study is discussed in the Appendix.

security wealth is treated as an exogenous variable because households are unable to choose the level of most of their social security benefits in Canada.[10] Incorporating the determinants of both life-cycle and transfer motives, we specify the following general form of the wealth equation:

$$(1) \qquad \ln W_i = f(L_i, \ln Y_i^*, \ln SSW_i, NCHL_i, X_i) + U_i$$

where, W = household fungible wealth or net worth, L = stage of the household life cycle, Y* = normal earnings, SSW = social security wealth, NCHL = number of children, X = a vector of observable variables which influence the wealth-age relationship, U = a random error which is distributed as $N(0, \sigma^2)$ and i is an index for household.

The data used reports the husband as the head of household regardless of whether he is the principal earner in the family or not. Therefore, to measure the household's stage in the life cycle (L) we include both the husband's and wife's ages. Social security wealth (SSW) is defined as the present value of the future stream of benefits from public retirement benefits plans.[11] The household's normal earnings are its

[10] We acknowledge that a portion of SSW may not be exogenous due to the existence of means test. Although a household can partially influence its earning by choosing hours worked, it has little or no control over market wages. Furthermore, a household has no control over social security rules. Thus we are of the opinion that entitlement to a significant part of SSW is beyond the control of a household and hence exogenous.

[11] We recognise the problems in estimating the stock variable (SSW) from the flow variables (C/QPP, OAS, GIS). For the current workers we have estimated the stock variable from the estimates of the flow variables. In the absence of longitudinal data the second-best choice would be a quasi-panel data set. However, it is not possible to construct a quasi-panel data set by pooling 1977 and 1984 SCFs because immigrant arrival periods are too broadly classified in the former survey.

predicted annual earnings corrected for its labour market participation probability. The vector X includes the following control variables: (i) presence of unemployed (UNEMP), (ii) farm family (FARM), (iii) urban area (URBAN) and (iv) regional dummies (REGION). Observed wealth may differ from desired wealth due to unemployment. The dummy variable for unemployment captures this transitory effect as well as the effects of sustained differences in unemployment experience across households. Furthermore, the net worth of a farm family is expected to be greater than that of nonfarm family, *ceteris paribus*. Recognizing the nonlinearity of net worth in the stage of the life cycle and the potential impact of the number of children on transfer wealth, we express the specific form of the wealth equation as:

$$
\begin{aligned}
(2) \qquad \ln W_i = {} & \alpha_0 + \alpha_1 Hage_i + \alpha_2 Hage_i^2 + \alpha_3 Wage_i + \alpha_4 Wage_i^2 + \alpha_5 \ln(Y_i^*) \\
& + \alpha_6 \ln(SSW_i) + \alpha_7 NCHL_i + \alpha_8 NCHL_i^2 \\
& + \alpha_9 UNEMP_i + \alpha_{10} FARM + \alpha_{11} URBAN_i + \sum_{j=12}^{15} \alpha_j REGION_{ij} + U_i
\end{aligned}
$$

where, Hage and Wage are the husband's age and wife's age respectively. The theoretically expected signs of the coefficients are:

i. $\alpha_1, \alpha_3 > 0$ and $\alpha_2, \alpha_4 < 0$ (inverted U-shape wealth-age profile);

ii. $\alpha_5 > 0$ (positive income elasticity of asset demand);

iii. $\alpha_6 \leq$ or > 0 (ambiguous effect of social security wealth);

iv. $\alpha_7 > 0$ and $\alpha_8 < 0$ (transfer wealth increases at a decreasing rate with the number of children)

Since the distribution of wealth is skewed to the right, the log of net worth is employed as the dependent variable to avoid any potential heteroscedasticity.[12]

The Data

The empirical analysis is based on the 1977 and 1984 microdata files extracted from the Survey of Consumer Finances. Our primary variable, household net worth, is defined as total household assets minus total household debts. Assets include total deposits, cash in hand, Canada Savings Bond, stocks, RRSP (registered retirement savings plan), RHOSP (registered home-ownership savings plan), the market value of cars, trucks and vans (primarily for personal use), the market value of other vehicles, the market value of owner-occupied homes, equity in real estate other than owner occupied homes, and equity in a business, a farm or a profession. Assets do not include the imputed values for public or private pension rights, the family's human capital, or consumer durables other than automobiles.

The 1984 microdata file contains 14,029 households from which we extract a sample of 8,877 households with married couples. The 1977 microdata file includes a total of 12,734 households. A sample of 8,685 married couples is taken from the 1977 survey. Three types of families are excluded from the analysis: (i) special family units,

[12]The distribution of wealth is highly skewed and a logarithmic transformation of this variable is desirable in this context in order to have a log-normally distributed dependent variable.

(ii) unattached individuals and (iii) other families.[13] Previous studies suggest that the wealth accumulation behaviour of low-wealth holders is significantly different from the rest of the population. King and Dicks-Mireaux (1982), Diamond and Hausman (1984) and Hubbard (1986) excluded the low-wealth holders from their analysis of household wealth accumulation based on the presumption that they face a liquidity constraint since they have little or no wealth to use as collateral to borrow money. Indeed, a preliminary analysis of our data set also suggests that the wealth-age profile of low-wealth holders does not follow an inverted U-shape. Thus, to facilitate our empirical investigation and follow conventions in the literature, households with less than $3,500 of net worth are excluded. Next, Heckman's (1976) two-stage estimation procedure is used to avoid a potential selectivity bias resulting from sample truncation.[14]

Table 2 reports some descriptive statistics for the estimation samples. The estimation sample for 1997 includes 7,017 Canadian-born and 1,668 foreign-born households. The 1984 sample includes 7,159 Canadian-born and 1,718 foreign-born

[13] The first category includes extremely wealthy families whose economic-demographic characteristics have been suppressed in the microdata tape. A significant proportion of the second and third types of families is headed by elderly women, perhaps widows. Permanent household income and hence the stock of net worth of these families depends on the lifetime income of their deceased husbands for which there exists no information in the data set. Furthermore, families under the title "other families" includes brother and sister living in the same dwelling, or grandparent living with grandson or granddaughter in the same house. The head of this type of family is not necessarily the principal earner and data are not available for the economic-demographic characteristics of other household members. Moreover, profiles of earnings and wealth for the 'male-headed families with wife present' is expected to differ significantly from the 'unattached' and 'other families.' Thus, the study is restricted to the focus on married couples.

[14] In the first stage, we estimate a probit model for low-wealth holders using the whole sample of married couples and obtain an estimate of the Inverse Mill's Ratio (IMR) for every household in the sample. The second stage uses the sub-sample of married couples with net worth ≥ $3,500, and yields an OLS estimate of the net worth equation by including the inverse Mill's ratio as an additional regressor in equation (2). The probit results are available from the author on request.

households. In both sample years, the mean net worth of foreign-born households exceeds its Canadian-born counterpart. Moreover, mean net worth of Canadian-born households declined from 90 percent to 85 percent (of that of foreign-born households) over the period 1977-84. But the ratio of Canadian-born median wealth to foreign-born median wealth remained around 71 percent in both sample years. On average, the foreign-born couples are 3 to 5 years older than the Canadian-born couples. Predicted annual earnings (or normal earnings) do not vary significantly by birthplace in 1977. The 1984 sample exhibits slightly higher (4 percent) predicted earnings for Canadian-born households. Mean social security wealth of immigrants is higher than that of Canadian-born in both sample years despite the limited access of immigrants to one component (OAS) of social security benefits for the elderly. This finding correctly implies that, in the Canadian milieu, if a foreign-born person is ineligible for a portion of his/her pension, supplementary public funds are made available through other elements of the social security program.

(INSERT TABLE 2)

5. EMPIRICAL RESULTS

The analysis of wealth accumulation is conducted at two levels. First, we estimate a single wealth equation for the whole sample (the restricted model) under the

assumption that the economic and demographic characteristics identically affect the savings behaviour of both the Canadian and foreign-born groups. A set of dummy variables indicating different periods of arrival in Canada is included in order to measure assimilation. In this case we calculate the time required for a newly arrived foreign-born household to catch up to the wealth level of a comparable Canadian-born household. Second, we offer an unrestricted model to relax the assumption of an identical parameter vector regardless of birthplace. Thus, under this model we estimate birth-status specific wealth accumulation equations.

Restricted Wealth Equation

The results of the restricted wealth-accumulation model are presented in Table 3. The coefficients for age and age squared are highly significant and confirm the existence of an inverted U-shaped wealth-age profile. The income elasticity of asset demand is 0.21 in 1977 and 0.15 in 1984, which implies a fall in savings propensity over the period 1977-84. The coefficients for children and children squared are significant and agree with Blinder's hypothesized signs for the transfer wealth, implying that the marginal transfer wealth declines in children. The coefficient for the social security wealth variable is insignificant for 1977 but significant for 1984. For the latter sample, public wealth was found to be an imperfect substitute for private wealth. More specifically, a dollar increase in social security in 1984 led to only a twelve cent reduction in private wealth.[15]

[15] The displacement effect is derived from the wealth equation using the following formula:

Displacement Effect = -0.1021 ($\bar{W}$ /$\overline{SSW}$), where $\bar{W}$ and $\overline{SSW}$ represent mean net worth and mean social security wealth respectively.

With all other included variables held constant, the presence of at least one unemployed person in the household reduces net worth by about 28 percent in both sample years. This large impact indicates that uncertainty, owing to spells of unemployment, affects household wealth accumulation. Location in Canada affects household wealth accumulation as farm households hold greater net worth than nonfarm households and the regional effects on accumulation are also significant. Assimilation affects are also present in the results. For example, in the 1984 sample, the coefficients of the dummy variables for arrival periods (the omitted category is household headed by a Canadian-born) suggest that the wealth holdings for post-1976 immigrant cohorts are about half that of comparable Canadian-born households. In addition, the wealth holdings of the 1972-76 immigrant arrival cohort was 26 percent lower than those born in Canada. Finally, wealth accumulation for the 1967-71 arrival cohort was not significantly different from comparable Canadian-born households. Thus, an immigrant household needs 15 years of settlement in Canada to catch up to the mean wealth level of a Canadian-born household with comparable economic-demographic characteristics.[16]

(INSERT TABLE 3)

Unrestricted Equation: Canadian-born vis-à-vis Foreign-born Accumulation

The birth-status specific wealth accumulation results appear in Table 4. The coefficients for age and age squared are again consistent with the inverted U-shape

[16] The difference between the sample year (1984) and the median value (1969) of the arrival period yields the estimated years of residence (15) in Canada.

wealth-age profile, a finding that remains robust across sample periods and birthplaces. The income elasticity of wealth is higher for Canadian-born households than that of foreign-born households in both years.

The interpretation of the dummy variables is straightforward. The coefficient for the unemployment dummy is highly significant with a negative sign in both foreign-born and Canadian-born equations. This implies that the observed wealth holding for a household will be less than the desired level if there exists an unemployed person in the household. The farm family dummy has a positive effect and the corresponding coefficients are almost identical in magnitude for both groups in 1984. The urban place of residence dummy obtains a statistically significant positive coefficient only in the 1984 foreign-born wealth equation. This result is due in part to involuntary accumulation in the form of capital gains in urban real estate.[17]

(INSERT TABLE 4)

Table 5 reports the accumulation rates over the life cycle of households. The first derivative of the log of the wealth equation with respect to the stage of household life cycle (L) yields the accumulation rate.[18] The 1977 results indicate that a typical foreign-born household accumulates wealth at a faster rate than the Canadian-born prior to age

[17] Our 1984 data show that since foreign-born households hold a greater fraction of their wealth in real estate inclusive of owner-occupied home, their capital gains are larger than those of their Canadian-born counterparts.

[18] See notes below Table 5 for the computation procedure.

50. After age 50, the results reverse. In sharp contrast, the 1984 results show a higher rate of accumulation for Canadian-born households at every stage of the life cycle than that of foreign-born households.

Next, we focus on the marginal transfer of wealth resulting from an increase in the number of children. Given that the wealth equation is semi-logarithmic in children and children squared and the number of children is a discrete variable, the marginal transfer of wealth ($\Delta W/\Delta$children) functions for 1984, based on table 4, can be expressed as:

(3) $$\text{Marginal transfer wealth}|_{\text{Canadian born}} = [0.0981 - 0.0196\{(\text{children})^2 - (\text{children} - 1)^2\}]W$$

(4) $$\text{Marginal transfer wealth}|_{\text{Foreign-born}} = [0.1393 - 0.0272\{(\text{children})^2 - (\text{children} - 1)^2\}]W$$

Similarly, one can derive the marginal transfer wealth results for 1977. For both the 1977 and 1984 samples, foreign-born households exhibit a strong transfer motive within the family network. In 1984, for the first child, the marginal transfer of wealth was $13,072 for a typical foreign-born household and $7,761 for a Canadian-born household.[19] Using the above pair of marginal transfer of wealth functions, we derive the increment in transfer wealth with respect to the number of children for different wealth levels. These results are depicted in Table 6. The results are consistent with the

[19] These figures are obtained by substituting the birth-status specific mean net worth in the relevant marginal transfer wealth function. Marginal transfer of wealth depends on the number of children and net worth. To isolate the pure effect of children on transfer wealth, the mean net worth ($102,307) for the whole sample was also used to compute the marginal propensity to transfer. The results indicate that for the first child, transfer of wealth was $11,469 for a foreign-born household and $8,031 for a Canadian-born household.

hypothesis that the transfer wealth increases with household net worth and increases at a decreasing rate with the number of children. For both sample years, foreign-born households revealed a stronger transfer motive than Canadian-born households. However, for the 1984 sample, the size of the transferred wealth is negligible after the second child.

The effect of social security on household net worth accumulation differs by period. For the 1977 sample, the effect of social security wealth on household net worth is not significantly different from zero. The 1984 results suggest that one additional dollar of social security wealth displaces fourteen cents of net wealth for the foreign-born and nine cents for the Canadian-born household (see Table 7). This latter finding is consistent with the life-cycle literature.

(INSERT TABLES 5, 6 AND 7)

6. SUMMARY AND CONCLUSIONS

We conclude with a summary of the major findings on household wealth accumulation by birth status. First, the empirical results are compatible with the notion of an inverted U-shaped wealth-age household profile. The shape of the wealth-age profile however, differs by birth status. The 1977 results indicate that, faced with the uncertainty in a new country of residence - Canada - immigrants accumulate wealth at a higher rate than the Canadian-born until age 49. Also, given limited access to old age security benefits and

little or no parental transfer wealth prior to arrival, foreign-born households dissipate wealth faster than the Canadian-born to finance their retirement consumption. The foreign-born wealth profile has a more pronounced inverted U shape than the Canadian-born profile. The 1984 results reveal that after age 24, compared to a Canadian-born household, a foreign-born household accumulates wealth at a lower rate over the working life span and also dissipates wealth at a higher rate during retirement.

The transfer motive for the foreign-born is stronger in both 1977 and 1984 than that of the Canadian-born. Canada's social security program also has a differential impact by birth status. Immigrants exhibit a slightly greater displacement effect on personal wealth from social security wealth than the Canadian-born in 1984. The net effect of public social security programs on national savings was positive in 1984 since the displacement effect of social security wealth is less than unity for both groups. Thus, our 1984 results suggest that public and private savings are not perfect substitutes due to the induced retirement effect.

These results lead to the major policy conclusion that this wealth effect should be recognized in Canada's immigrant selection criteria. For example, the post-1977 immigration policy switched the composition of immigrants from the economic class to the family class. The observed reduced foreign-born accumulation rates in 1984 may be a partial outcome of this policy change.

The limitations of this study are few but non-trivial. First, due to a lack of data, this study did not include private pension wealth as an exogenous variable in the wealth accumulation function. Second, if the productivity characteristics and preferences of

households are unstable due to cohort or period effects, then the wealth-age profile and assimilation results may change as the 1977 and 1984 tests indicate. Finally, if wealthy individuals live longer, then the observed slower rate of wealth dissipation during retirement does not necessarily imply that the prediction of the life-cycle model is contradicted by our observation.

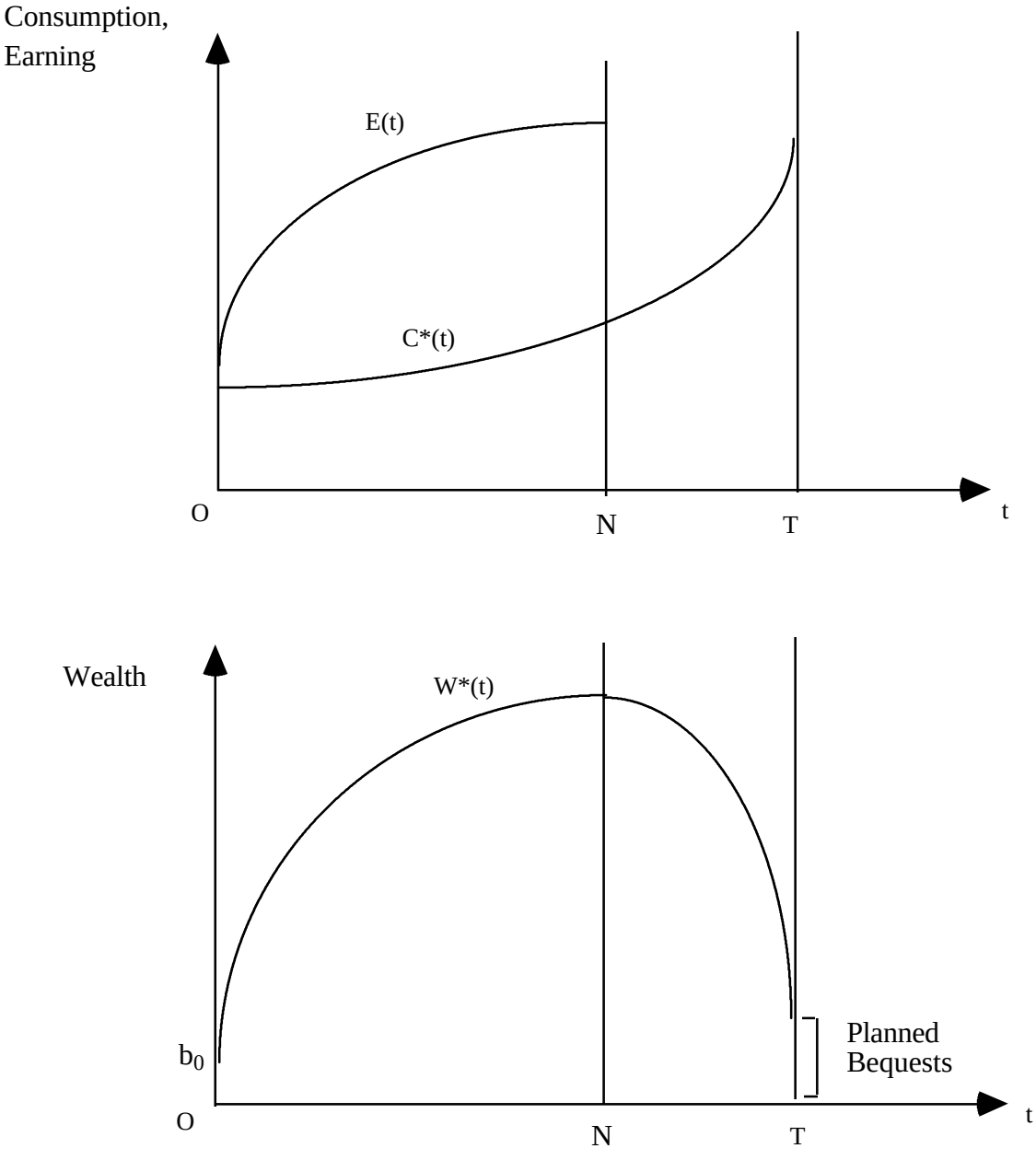

FIGURE 1 Life-cycle consumption and wealth accumulation profiles

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TABLE 1
CANADIAN POPULATION BY ETHNIC ORIGIN, 1986 CENSUS[a]
(IN PERCENTAGE)

	British	French	Other European	Asiatic	Aboriginal Black & Caribbean	Other	Row Total[b]
Birthplace Group							
Canadian-born married Persons	46.5	32.1	11.3	0.3	1.3	8.3	100.0 (188,076)
Foreign-born married Persons	26.8	2.7	45.8	16.6	2.8	5.3	100.0 (51,817)
Period of Immigration to Canada							
Before 1946	51.0	4.5	39.3	1.2	0.1	3.9	100.0 (4,617)
1946-67	27.1	2.6	61.1	4.6	0.9	3.7	100.0 (26,140)
1968-77	22.3	2.4	31.6	30.2	6.4	7.1	100.0 (13,447)
1978-86	18.0	2.4	22.7	44.4	4.6	7.9	100.0 (7,447)

Notes: The figure in parenthesis represents the number of observations in each cohort.

TABLE 2
DESCRIPTIVE STATISTICS OF THE ESTIMATION SAMPLES[a]

	1977 Sample Means (Medians)		1984 Sample Means (Medians)	
Variable	Canadian-Born Households	Foreign-Born Households	Canadian-Born Households	Foreign-Born Households
Net Worth (In 1984 CAD$)	138,421	154,312	98,874	116,611
	(71,788)	(100,917)	(55,410)	(78,697)
Ln(Net Worth)	9.84	10.451	10.18	10.499
Husband's Age	43.7	48	45	50
(Husband's Age)^2	2,135	2,512	2,265	2,695
Wife's Age	41	44	42	46
(Wife's Age)^2	1,887	2,193	2,016	2,354
Normal Earnings (In 1984 CAD$)	21,018	21,233	24,365	23,382
	(22,155)	(20,916)	(25,169)	(24,506)
Ln(Normal Earnings)	9.69	9.688	9.616	9.567
Number of Children	1.58	1.41	1.24	1.31
(Number of Children)^2	4.90	3.95	3.12	3.42
Social Security Wealth	74,569	76,396	86,156	90,188
(In 1984 CAD$)	(69,730)	(73,284)	(80,627)	(87,541)
Ln(Social Security Wealth)	11.177	11.111	11.30	11.31
Presence of Unemployed[b]	0.28	0.24	0.31	0.27
Farm Family[c]	0.54	0.035	0.04	0.02
Urban Family[d]	0.46	0.73	0.57	0.82
Regional dummies:[e]				
Atlantic	0.23	0.046	0.20	0.03
Quebec	0.24	0.13	0.24	0.12
Prairies	0.08	0.15	0.22	0.20
B.C.	0.21	0.20	0.09	0.15
IMG[f]		0.192		0.194
Dummy Variables for Immigrant				
Arrival Periods:[g]				
IMGB46		0.042		0.028
IMGA46		0.150		

IMG66				0.091
IMG71				0.025
IMG76				0.028
IMG81				0.017
IMG84				0.005
Sample Size	7017	1668	7159	1718

Notes:

a. Data sources: Statistics Canada (1977, 1984).
b. A dummy variable for the presence of at least one unemployed person in the household.
c. A dummy variable for farm family.
d. The urban dummy variable takes a value of unity if the household lives in an urban area with greater than 30,000 people and zero otherwise.
e. The reference category is Ontario.
f. The variable takes a value of unity if the household is headed by a foreign-born person and zero otherwise.
g. The dummy variables for the arrival periods are: IMGB46 (before 1946); IMGA46 (after 1945); IMG66 (1946-1966); IMG71(1967-1971); IMG76(1972-1976); IMG81(1977-1981); IMG84(1981-1984). The mean of an immigrant arrival dummy in this table shows the proportion of the foreign-born cohort in the sample of all households, not in the sub-sample of all immigrant households.

TABLE 3
HOUSEHOLD WEALTH ACCUMULATION: RESULTS FOR ALL HOUSEHOLDS
DEPENDENT VARIABLE: LN (NET WORTH)

	1977 Results		1984 Results	
	Coefficients	(t-statistics)[a]	Coefficients	(t-statistics)[b]
Constant	6.171	(16.75)	7.592	(19.15)
Husband's Age	0.07883	(6.74)	0.06034	(5.93)
Husband's Age^2	-0.0006344	(-5.47)	-0.00046	(-4.65)
Wife's Age	0.03348	(3.15)	0.0581	(5.81)
Wife's Age^2	-0.000223	(-2.07)	-0.000415	(-4.17)
Ln (Normal Earnings)	0.2052	(9.04)	0.1452	(9.74)
Children	0.1603	(8.23)	0.1056	(4.82)
Children^2	-0.0204	(-6.27)	-0.0212	(-4.37)
Ln (SSW)	0.010	(0.49)	-0.1021	(-3.23)
Presence of Unemployed	-0.2849	(-7.94)	-0.2826	(-10.90)
Farm Family	1.229	(23.46)	1.186	(20.28)
Urban Family	0.00132	(0.04)	0.00903	(0.321)
Atlantic	-0.0509	(-13.73)	-0.2767	(-7.72)
Quebec	-0.5392	(-15.95)	-0.2621	(-8.48)
Prairies	-0.0522	(-1.52)	-0.0805	(-2.57)
B.C.	-0.0725	(-1.68)	0.1370	(3.52)
IMGB46	0.0344	(0.57)	0.06070	(0.91)
IMGA46	-0.0879	(-2.49)		
IMG66			0.1716	(4.48)
IMG71			0.0434	(0.61)
IMG76			-0.2635	(-3.74)
IMG81			-0.5379	(-5.89)
IMG84			-0.5046	(-2.90)
IMR[b]	-0.0023	(-0.013)	-0.0911	(-0.64)
$\bar{R}^2$	0.30		0.30	
F-Statistic	183.6		154.1	
[Degrees of Freedom]	[18, 7628]		[22, 7852]	

Standard Error Corrected for Selection	0.9943	0.9402
Selected Sample	7,647	7,875
Excluded Sub-sample of Low Wealth Holders	1,038	1,002

Notes:

a. The figures in parentheses are the corresponding heteroskedisticity-consistent t-statistics, computed as the ratios of the coefficient estimates to the square roots of the respective diagonal elements of Greene's (1981) estimated asymptotic covariance matrix of coefficients.

b. Inverse Mill's Ratio.

TABLE 4
HOUSEHOLD WEALTH ACCUMULATION BY BIRTH PLACE[a]
DEPENDENT VARIABLE: LN (NET WORTH)

	1977 Results		1984 Results	
	Canadian-Born Households	Foreign-Born Households	Canadian-Born Households	Foreign-Born Households
Constant	6.3001	6.1343	7.2692	8.1254
	(13.94)	(8.24)	(12.21)	(11.91)
Husband's Age	0.077785	0.09848	0.0570	0.0737
	(5.84)	(3.92)	(5.07)	(2.90)
Husband's Age^2	-0.000641	-0.000781	-0.00044	-0.00057
	(-4.84)	(-3.15)	(-3.99)	(-2.44)
Wife's Age	0.028819	0.044357	0.0577	0.0487
	(2.40)	(1.93)	(5.15)	(2.15)
Wife's Age^2	-0.000151	-0.000412	-0.00039	-0.00038
	(-1.23)	(-1.78)	(-3.49)	(-1.75)
Ln (Normal Earning)	0.21414	0.14121	0.1552	0.0754
	(8.64)	(2.41)	(9.11)	(2.21)
Children	0.15656	0.16182	0.0981	0.1393
	(7.39)	(2.99)	(4.00)	(2.75)
Children^2	-0.02038	-0.01505	-0.0196	-0.0272
	(-5.93)	(-1.37)	(-3.59)	(-2.52)
Ln (SSW)	0.0025256	0.0089602	-0.0827	-0.1054
	(0.08)	(0.33)	(-1.43)	(-2.29)
Presence of Unemployed	-0.28891	-0.26448	-0.2851	-0.2257
	(-7.30)	(-3.15)	(-10.15)	(-3.26)
Farm Family	1.1946	1.3927	1.1829	1.1741
	(21.18)	(9.71)	(19.25)	(6.21)
Urban Family	-0.006802	0.064053	-0.0142	0.1634
	(-0.20)	(0.92)	(-0.48)	(2.07)
Atlantic	-0.52295	-0.25458	-0.2950	0.0521
	(-13.08)	(-1.92)	(-7.79)	(1.63)

Quebec	-0.54089 (-14.38)	-0.52437 (-6.18)	-0.2950 (-7.68)	-0.2878 (-3.57)
Prairies	-0.03781 (-0.96)	-0.090395 (-1.26)	0.0805 (2.27)	0.0705 (1.02)
B.C.	0.053437 (1.04)	0.12008 (1.48)	0.1335 (2.88)	0.1663 (2.30)
IMGA46		-0.16049 (-1.78)		
IMG66				0.0889 (0.98)
IMG71				-0.0514 (-0.40)
IMG76				-0.3583 (-2.56)
IMG81				-0.6402 (-4.25)
IMG84				-0.5884 (-2.47)
IMR	-0.0148 (-0.08)	0.020 (0.05)	-0.1052 (-0.78)	-0.2554 (-0.67)
$\bar{R}^2$	0.31	0.24	0.31	0.26
F-Statistic [Degrees of Freedom]	174.8 [16, 6107]	29.3 [17, 1505]	175.2 [16, 6324]	25.7 [21, 1512]
Standard Error Corrected for Selection	0.99066	1.0028	0.9345	0.9636
Selected Sample	6124	1523	6341	1534
Excluded Sub-sample of Low Wealth Holders	893	145	818	184

Notes:

a. The figures in parentheses are the corresponding heteroskedisticity-consistent t-statistics, computed as the ratios of the coefficient estimates to the square roots of the respective diagonal elements of Greene's (1981) estimated asymptotic covariance matrix of coefficients.

TABLE 5
HOUSEHOLD WEALTH ACCUMULATION RATES BY BIRTH PLACE
(IN PERCENTAGE)

Age Group[a] (Husband's Age)	Canadian-born households		Foreign-born households	
	1977 Sample	1984 Sample	1977 Sample	1984 Sample
Below 25	7.179	7.798	9.032	8.042
25-29	6.439	7.086	7.942	6.204
30-34	5.664	6.320	6.865	5.441
35-39	4.883	5.522	5.768	4.736
40-44	4.104	4.732	4.580	3.942
45-49	3.310	3.940	3.317	3.140
50-54	2.522	3.103	2.163	2.359
55-59	1.737	2.267	1.065	1.489
60-64	0.958	1.420	-0.182	0.634
65-69	0.184	0.657	-1.285	-0.112
70-74	-0.592	-0.119	-2.497	-0.813
75-79	-1.385	-0.879	-3.665	-1.507
80 and above		-1.663		-2.314

Notes:

a. The rate of accumulation is defined as: $\frac{1}{W}\frac{dW}{L_i} = (\hat{a}_1 + 2\hat{a}_2 M_i) + (\hat{a}_3 + 2\hat{a}_4 F_i)$, where, M_i is the median age of husbands in group i, $\hat{a}_1$ and $\hat{a}_2$ are the coefficients of the husband's age and age^2 respectively for the wealth accumulation equation, F_i is the median age of wives whose husbands belong to age group i, $\hat{a}_3$ and $\hat{a}_4$ are the coefficients of the wife's age and age^2 respectively.

b. Source: Table 4

TABLE 6
MARGINAL TRANSFER WEALTH WITH RESPECT TO THE NUMBER OF CHILDREN[a]
(IN 1984 DOLLARS)

	Canadian Born Households			Foreign-born Households		
	Number of Children			Number of Children		
Net Worth	1	2	3	1	2	3
1977 RESULTS						
$25,000	3,914	2,386	1,367	4,046	2,917	2,164
$100,000	15,656	9,542	5,466	16,182	11,667	8,657
$500,000	78,280	47,710	27,330	80,910	58,335	43,285
1984 RESULTS						
$25,000	1,963	983	3	2,803	1,443	83
$100,000	7,800	3,930	10	11,210	5,770	330
$500,000	39,250	19,650	50	56,050	28,850	1,650

a. Source: Table 4 and equations (3) and (4).

TABLE 7
EFFECTS OF SOCIAL SECURITY WEALTH ON HOUSEHOLD WEALTH: 1984 RESULTS[a]
(IN 1984 DOLLARS)

	Mean Net Worth (Median)	Mean SSW (Median)	Effect of a Dollar Increase in SSW on Private Net Worth*
All households	102,306.8 (59,244)	86,936.3 (82,198)	-0.12
Canadian-born households	98,873.9 (55,410)	86,155.9 (80,627)	-0.09
Foreign-born households	116,611.4 (78,697)	90,187.8 (87,541)	-0.14

a. Evaluated at mean net worth and mean social security wealth.
Source: Table 3.

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APPENDIX

A. ESTIMATION OF NORMAL EARNINGS

Normal household earnings are defined as the sum of the husband's and the wife's predicted annual earnings. Earnings equations by sex and place of birth were estimated for married individuals. To avoid potential bias in estimating normal annual earnings resulting from differences in labour market participation probability across individuals, the earnings equation is estimated in two stages. First, a probit model of labour market participation has been estimated for all sample members. From this probit model we compute the Inverse Mill's Ratio (IMR) for every individual. Second, an earnings equation is estimated using the IMR as an additional regressor. The hypothesis of identical earnings generation process for the Canadian-born and the foreign-born is rejected by the F-test. The results in general are consistent with the human-capital theory. Hence, earnings equations by birthplace are estimated. Detailed results are available from authors on request.

B. ESTIMATION OF SOCIAL SECURITY WEALTH

1. Social Security Wealth for Current Retirees

Estimates of the household's social security wealth is based on the current (1984) social security rules. For retirees the method used to calculating social security wealth is straightforward. Let SSB_p be the sum of currently received public pension benefits in the form of CPP/QPP, OAS and GIS; LE is the conditional life expectancy; g and d respectively stand for the expected real growth rate of social security benefits per annum and the real discount rate. For current retirees household social security wealth (SSW_p) is estimated as:[20]

$$SSW_p = \int_{t=0}^{LE} SSB_p \, e^{(g - d)t} \, dt \qquad \text{(B1)}$$

$$= \frac{SSB_p}{g - d} \{e^{(g - d)LE} - 1\}$$

2. Social Security Wealth for Current Workers

The expected social security benefit of a worker at the first year of retirement (age 65) is given by

$$ESSB_L = SSB_L e^{gLR} \qquad \text{(B2)}$$

where LR stands for the years to retirement (65 minus AGE), g is the anticipated real growth rate of mean social security benefits for prospective retirees, SSB_L is the imputed base social security benefit for a current worker, i.e., benefits one would receive if he or she retired in the current year (1984). The social security wealth for current workers (SSW_L) can be expressed by the following relation:

[20] Life expectancy data are available for males and females separately. However, SSB_r data are not available for husband and wife separately. For a family with both husband and wife of at least 65 years of age household life expectancy is computed as the average of husband's and wife's life expectancy.

$$SSW_L = \int_{t=0}^{LD} ESSB_L \, e^{gt} \, e^{-d(t + LR)} \, dt \qquad \text{(B3)}$$

$$= \frac{ESSB_L * e^{-d*LR}}{g - d} \{e^{(g - d)LD} - 1\}$$

where LD stands for the expected *years of retirement.* Note that the term, $ESSB_L * e^{-d*LR}$ represents the present value of the annual social security benefit attainable at the first year of retirement (age 65). This benefit is expected to grow at the rate of g per annum in the post retirement years until the date of death. However, different components of $ESSB_L$ grow at different rates. For example, the real growth rate of CPP/QPP benefits is zero after retirement, while the growth rates of OAS, GIS or SPA benefits are subject to government discretion. For current workers, first, individual components of social security benefits are estimated to obtain a measure $ESSB_L$.

a. Canada/Quebec Pension Plan Benefits:

Annual CPP/QPP benefits are determined by the following formula:

$$RP_{it} = 0.25(\overline{YMPE}_t * AER_{it}) \qquad \text{(B4)}$$

where,

RP_{it} = the retirement pension for individual i, who retires in year t,

$\overline{YMPE}_t$ = maximum pensionable earnings - averaged over the three years ending with his/her year of retirement. More specifically,

$$RP_{it} = 0.25\left[\frac{YMPE_{t-2} + YMPE_{t-1} + YMPE_t}{3}\right] * \left[\frac{1}{m}\sum_{j=1}^{m} \frac{PE_{i.t-j}}{YMPE_{t-j}}\right] \qquad \text{(B5)}$$

Note that a year's maximum pensionable earnings is the same for all individuals while pensionable earnings, PE, lie between YMPE and the year's basic exemption (YBE) and may vary across individuals. From cross-sectional data it is not possible to derive a life-cycle earnings profile for every sample member. Therefore, pensionable earnings over the contributory period cannot be determined. Hence, an alternative procedure is employed to estimate the average earnings ratio (AER). An individual's normal earnings (Y_i^*), as defined in Appendix A, is compared with 1983 maximum pensionable earnings to determine the AER. In particular,

$$\begin{aligned} AER_i &= 1 && \text{if } Y_i^* > YMPE_{1983} \\ AER_i &= \frac{Y_i^*}{YMPE_{1983}} && \text{if } YBE_{1983} < Y_i^* < YMPE_{1983} \\ AER_i &= 0 && \text{if } Y_i^* < YBE_{1983} \end{aligned} \qquad \text{(B6)}$$

In 1983, the YBE was $1,800 and, YMPE was $18,500. To compute a three-year average of maximum pensionable earnings, it is assumed that YMPE will increase at a constant annual rate, n. For an

employee who was G years old in 1983, we compute his or her average maximum pensionable earning as:

$$\overline{YMPE}_t = \frac{1}{3}\left[\sum_{t=0}^{2}(1 + n')^{65 - G - t}\right] YMPE_{1983} \qquad \text{(B7)}$$

Now substituting equation (B6) and (B7) into (B4) the CPP/QPP benefit component of expected social security benefits ($ESSB_L$) can be computed.

b. Old Age Security Benefits:

In computing old age social security benefits, residency requirements are explicitly recognized.[21] It is assumed that all Canadian-born individuals satisfy the residency requirements that enable them to receive full OAS benefits. For all foreign-born individuals of age less than 65, their prospective years of residence at age 65 were computed, after which OAS pension rules were applied. In 1983 the maximum annual OAS pension was $3013.44. The expected OAS pension at age 65 is estimated in the following manner:

(i) Foreign-born individuals with at least 40 years of residence and all Canadian-born individuals are expected to receive

$$OAS_i = 3013.44\ (e^{gLR_i})$$

(ii) Foreign-born individuals with 10 to 39 years of residence (RES) will receive

$$OAS_i = \left[\frac{RES}{40}\right] * 3013.44\ (e^{gLR_i})$$

(iii) Foreign-born individuals with less than 10 years of residence will receive

$$OAS_i = 0$$

c. Guaranteed Income Supplements:

The GIS benefit is income-tested. To perform this test for current workers, future retirement income must first be estimated. The imputation of future retirement income among current workers is based on a regression of the log of annual income of current retirees on their economic-demographic characteristics. The results are available from the authors on request. Based on these regression coefficients, the potential retirement income for current workers is imputed. Given this potential retirement income, an income test for the eligibility of GIS benefits is performed and then GIS benefits are computed for every family. In 1983 the maximum GIS received was $3025.2 for a single person and $4664.9 for a married couple. The maximum GIS benefit is reduced by $1 for every $2 of other income. The GIS component of expected social security benefits (ESSB in equation B2) is computed in the following manner:

Wife of a pensioner: $GIS = Max\{ ((2332.4 - (0.5*WINC)), 0\}_e^{gWLR}$

Husband of a pensioner: $GIS = Max\{ ((2332.4 - (0.5*HINC)), 0\}_e^{gHLR}$

[21]Dicks-Mireaux and King (1984) ignored the residency test and assumed that everyone of at least 65 years of age received full OAS benefits. This method overestimates the benefits to immigrants. The main focus of their study, however, was to test the life-cycle hypothesis rather than an examination of immigrant wealth accumulation behaviour.

Both husband and wife are in working age:

$$GIS = Max\{ ((4664.9 - (0.5*FINC)), 0\}_e^{gALR}$$

where, WINC, HINC and FINC are the imputed annual income of wives, husbands and families respectively; WLR and HLR are "years to retirement" for wife and husband respectively and ALR = (HLR+WLR)/2.

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