Research Paper

Economic Analysis (EA) Research Paper Series

Income Adequacy in Retirement: Accounting for the Annuitized Value of Wealth in Canada

by John R. Baldwin, Marc Frenette, Amélie Lafrance and Patrizio Piraino

Economic Analysis Division
18-F, R.H. Coats Building, 100 Tunney's Pasture Driveway
Telephone: 1-800-263-1136

Statistics Canada   Statistique Canada

Canadä

Income Adequacy in Retirement: Accounting for the Annuitized Value of Wealth in Canada

by

John R. Baldwin, Marc Frenette, Amélie Lafrance and Patrizio Piraino

Published by authority of the Minister responsible for Statistics Canada

La version française de cette publication est disponible (n⁰ 11F0027M au catalogue, n⁰ 074).

Note of appreciation
Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

Standards of service to the public
Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner. To this end, the Agency has developed standards of service which its employees observe in serving its clients. To obtain a copy of these service standards, please contact Statistics Canada toll free at 1-800-263-1136. The service standards are also published on www.statcan.gc.ca. Under "Our agency" click on About us > The agency > and select "Providing services to Canadians".

Economic Analysis Research Paper Series

The Economic Analysis Research Paper Series provides for the circulation of research conducted by the staff of National Accounts and Analytical Studies, visiting Fellows and academic associates. The research paper series is meant to stimulate discussion on a range of topics including the impact of the New Economy, productivity issues, firm profitability, technology usage, the effect of financing on firm growth, depreciation functions, the use of satellite accounts, savings rates, leasing, firm dynamics, hedonic estimations, diversification patterns, investment patterns, the differences in the performance of small and large, or domestic and multinational firms, and purchasing power parity estimates. Readers of the series are encouraged to contact the authors with comments, criticisms and suggestions.

The primary distribution medium for the papers is the Internet. These papers can be downloaded from the Internet at www.statcan.gc.ca for free.

All papers in the Economic Analysis Series go through institutional and peer review to ensure that they conform to Statistics Canada's mandate as a government statistical agency and adhere to generally accepted standards of good professional practice.

The papers in the series often include results derived from multivariate analysis or other statistical techniques. It should be recognized that the results of these analyses are subject to uncertainty in the reported estimates.

The level of uncertainty will depend on several factors: the nature of the functional form used in the multivariate analysis; the type of econometric technique employed; the appropriateness of the statistical assumptions embedded in the model or technique; the comprehensiveness of the variables included in the analysis; and the accuracy of the data that are utilized. The peer group review process is meant to ensure that the papers in the series have followed accepted standards to minimize problems in each of these areas.

<div align="right">

Publications Review Committee
Analytical Studies Branch, Statistics Canada
18th Floor, R.H. Coats Building
Ottawa, Ontario K1A 0T6

</div>

Symbols

The following standard symbols are used in Statistics Canada publications:

.   not available for any reference period
..   not available for a specific reference period
…   not applicable
0   true zero or a value rounded to zero
0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p} preliminary
^{r} revised
x   suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F   too unreliable to be published
*   significantly different from reference category ($p < 0.05$)

Table of Contents

Abstract

Discussions of pension adequacy for elderly Canadians have used the rate at which income falls with age—the income replacement rate or the ratio of post-retirement income to pre-retirement income. Use of income streams to assess post-retirement welfare requires a standard against which adequacy of the replacement rates can be judged. Because some expenditures (for example, work-related expenses) can be expected to fall after retirement, a declining income stream does not necessarily signal financial problems for seniors. More importantly, income as normally measured captures only part of what is available to seniors if households possess assets, which in retirement are not being used to generate measured income.

This paper uses a different metric, referred to as "potential" income. Potential income is the sum of realized income and the income that could be realized from owned assets such as mutual funds and housing. Households prepare for retirement by saving and borrowing and investing the proceeds. The assets accumulated over a lifetime may or may not be drawn down in later years. If they are not, income streams underestimate the "potential" income available to support retirement. This paper takes this potential into account when comparing the pre- and post-retirement financial status of Canadian households.

Based on data from the 1999 Survey of Financial Security, this analysis shows that when "potential income" is considered, households headed by seniors (aged 65 or older) compare much more favorably with younger households than when normally measured income is utilized. Indeed, when after-tax estimates are used, the potential income per adult-equivalent in senior households exceeds the income of households headed by younger adults.

Executive summary

Discussions of pension adequacy for elderly Canadians have used different metrics to inform the debate on how seniors fare as they move into retirement. One metric is the rate at which income falls as seniors age—the income replacement rate or the ratio of post-retirement income to pre-retirement income (LaRochelle-Côté, Myles, and Picot, 2008; Ostrovsky and Schellenberg 2009). A second metric is the consumption replacement rate (Lise 2003; Lafrance and LaRochelle-Côté 2011).

Both are less than perfect. Using income streams to assess post-retirement welfare requires a standard against which the adequacy of the replacement rates can be judged. Because some expenditures (for example, work-related expenses) are likely to fall after retirement, declining income streams do not necessarily signal financial problems for seniors. More importantly, income as normally measured captures only part of what is available to seniors if households have assets that in retirement are not being used to generate measured income.

Alternatively, basing assessments of post-retirement status on consumption is a viable means of evaluating well-being only if the items included in consumption are all that concern households. But for several reasons, consumption of the goods and services that are normally measured may not fully capture seniors' well-being. For example, the benefits of housing often go unmeasured. As well, gifts and savings for bequests may not be reflected in the consumption streams as they are typically measured.

A third metric, referred to as "potential income," addresses the shortcomings of income and consumption as indicators of financial well-being. Potential income is the sum of realized income and the potential income that could be realized from owned assets such as mutual funds and housing. Households might be expected to prepare for retirement by saving and borrowing, and investing the proceeds. The assets that are accumulated over a lifetime may or may not be drawn down in later years. If they are not, income streams and consumption streams both underestimate the "potential" available to households in retirement. This paper uses data from the 1999 Survey of Financial Security to take that potential into account when comparing the pre- and post-retirement financial situation of Canadian households.

It does so by calculating the annuitized value of non-housing and housing assets possessed by households and adding it to the actual income streams of retirement-age households (headed by an individual aged 65 or older). The result is then compared with the income of households headed by younger adults to see if the addition of "potential" income changes the relative financial situations of Canadian households. Corrections are made for household size at different stages in the life cycle. The comparisons are presented on a before- and after-tax basis.

The inclusion of the annuitized values of net wealth significantly increases the level of financial well-being of retirement-age households relative to working-age households, with most of this increase coming from housing wealth. The mean before-tax income per adult in households headed by seniors aged 65 to 74 is 74% of that of households headed by 45- to 64-year-olds. When non-housing wealth is considered, this ratio rises to 82%, and when housing wealth is included, it increases to 88%.

Calculations using after-tax rather than before-tax income yield an even greater improvement in the relative position of retirement-age households. The mean after-tax income per adult of households headed by 65- to 74-year-olds is 79% of that of households headed by 45- to 64-year-olds. When non-housing wealth is considered, this figure increases to 95%, and when housing wealth is included, it increases to 105%.

These wealth adjustments also bring the income distributions of retirement-age households closer to those of working-age households.

1   Introduction

Discussions about income adequacy in retirement have focused on either income or on consumption. LaRochelle-Côté, Myles and Picot (2008) and Ostrovsky and Schellenberg (2009) examine the income replacement rate of retirees, that is, the ratio of post-retirement income to pre-retirement income. Lise (2003) and Lafrance and LaRochelle-Côté (2011) look at consumption.

Studies that focus on consumption assume that the actual stream of purchases determines well-being; those that examine income assume that the receipts do so because they determine the potential for satisfying needs rather than just the goods and services that are consumed.

After retirement, income typically falls, while consumption remains relatively constant. Potentially, however, this gap can be bridged. In a world where earning power is higher in mid-life, labour income might be expected to decline in retirement, but the decrease could be offset by income from assets created by savings during the years of higher earnings or by the liquidation of those assets. This paper investigates that possibility by examining the "potential" income on which households could draw to finance their consumption in retirement, specifically, the "potential" income that wealth generates for retirees.

That potential does not need to be realized as income for it to be relevant to discussions of the adequacy with which Canadians have prepared for retirement—nor does this paper argue that it should be. While retirees may choose not to take advantage of their assets in this manner, they are available, and to ignore them may bias discussions about income adequacy in retirement.

Comparisons are made here of the income of retirement-age and working-age households by asking what the total income of retirement-age households would be if they liquidated their assets and purchased an annuity. This concept, which has been used in other studies (Weisbord and Hansen, 1968; Wolfson, 1979; Wolff and Zacharias, 2009), is referred to as "potential" income.

1.1   Outline

The report proceeds as follows. Sections 2 and 3 explain the main concepts and provide descriptive statistics based on the raw data.

Section 4 presents the four measures of "income" that are estimated in the analyses. The first estimate is actual income. The second is actual income plus the imputed income derived from owner-occupied housing, which is not usually considered in studies that measure earnings, although it is included in the National Accounts as income accruing to households. Home ownership provides a net income stream above and beyond the out-of-pocket expenses incurred to run a household. The source of the income derived from owned housing services originates in the equity built up in a home over a lifetime of investment. This paper uses the estimates that were developed by Brown, Hou and Lafrance (2010).

The third and fourth income estimates include two types of annuitized wealth, which is added to income in two steps in order to evaluate the importance of each. The third estimate is derived by adding the annuitized value of net worth from all assets except housing to the income of retirement-age households. A retiree may have a considerable Registered Retirement Savings Plan (RRSP) by age 65, but may not draw on it for several years after retirement. Similarly, individuals with equity in a business can liquidate that asset and use the proceeds to support retirement, but may choose not to do so immediately. Second homes or other property that could be sold to sustain the retiree may be retained because they are seen as a valuable investment even if they are not generating an income stream.

Finally, the fourth estimate adds the annuitized value of the principal residence to the income of retirement-age households. A homeowner may continue to live in their principle residence, thereby deriving the implicit income from housing included in the second estimate, but have an asset that can be exploited via a reverse mortgage or other financial transaction.

In Section 5, the distributions of the various estimates of income are compared across retirement-age and working-age households. The distributions of each income estimate are plotted to illustrate the changes across groups and income measures, and a series of transition matrices are estimated that show, for both types of households, the probability of being in each wealth-adjusted quintile given the quintile of origin in the actual income distribution.

Section 6 summarizes the findings of the study. The robustness of the results to changes in a number of assumptions is presented in Appendix C.

2   Data and concepts

The data are from the 1999 Survey of Financial Security (SFS 1999).[1] While the 2005 SFS contains similar information, the 1999 version is used because its larger sample size makes it possible to conduct reliable analyses at the level of detail required here. The study demonstrates how the results vary when only the actual income of working-age and retirement-age households is considered versus when their "potential" income is compared. Although the data are more than a decade old, they provide guidance about whether estimates of "potential" income should be part of the debate about Canadians' preparations for retirement.

The 1999 SFS collected information about the assets and debts of families and unattached individuals (Figure 1). Data collection took place in all provinces from May through July 1999. Information was obtained about the value of all major financial and non-financial assets and about the money owing on mortgages, vehicles, credit cards, student loans, and other debts. The value of these assets less debts is referred to in this report as net worth. Household net worth is the amount of money that would be left if households sold all their assets and paid all their debts.

For the first time in a Canadian survey of assets and debts, the 1999 SFS included the value of employer pension plan benefits.[2] This is an important part of the wealth of Canadians, as it provides many with at least a portion of the income needed in retirement.

This report presents two concepts of net worth or "wealth": in the first, wealth includes everything except the principal residence; in the second, wealth also includes the value of the principal residence (net of mortgage debt).

---

1. This section draws on Statistics Canada (2001a, 2001b).
2. Surveys of wealth are difficult to conduct. Respondents may under-report wealth because of sensitivities or because of lack of knowledge about precise details of some assets (such as RRSPs). However, comparisons of the 1999 Survey of Financial Security with administrative data suggest the net wealth of individuals (assets minus debt) is quite accurate for the population as a whole. Therefore, this analysis focuses on aggregate data.

Figure 1
Components of net worth in 1999 Survey of Financial Security

<div>

Total Assets

Private pension assets
    Registered Retirement Savings Plans
    Registered Retirement Income Funds
    Employer pension plans
    Other pension assets
Financial assets (other than pension)
    Deposits
    Stocks, bonds, mutual funds
    Other financial assets
Non-financial assets
    Principal residence
    Other real estate
    Vehicles
    Contents of residence, valuables
Equity in business

</div>

Less

<div>

Total debts

Mortgages on:
    Principal residence
    Other real estate
Other forms of debts
    Credit card debt
    Line of credit debt
    Vehicle loans
    Student loans
    Other loans and debts

</div>

Equals

Net worth

Source: Statistics Canada. Cat. No.13-596-XIE.

The unit of analysis in this study is the economic family (household). This is because assets and debts are typically reported for the household as a whole, not for each member. A household includes unattached individuals and families of two or more people who live in the same dwelling (household) and are related by blood, marriage, common-law or adoption.

Household income, calculated as the sum of the income of each adult member, includes wages and salaries, self-employment income, investment income, income from retirement pensions, child tax benefits, Old Age Security pensions, Guaranteed Income Supplements, CPP/QPP benefits, employment insurance benefits, social assistance, workers' compensation, GST/HST tax credits, provincial and territorial tax credits, other income, and support payments.

Comparisons of the income of households at different stages of their life cycle must account for differences in household size. Households headed by individuals in their sixties or seventies are generally smaller than those headed by individuals in their forties or fifties. A post-retirement reduction in income is likely to be less serious if the size of the household being supported also decreases.

To compare per capita income, total household income could simply be divided by the number of household members. This, however, ignores the possibility of economies of scale in consumption—two people can live less expensively together than separately because, for example, they can share consumption items such as utilities and major appliances. In fact, consumption studies often adjust by a factor other than the number of household members. A common method (Pendakur, 1998; Lise, 2003) is to define an adult-equivalent-adjusted value of consumption and to deflate household consumption variables by an equivalence scale.[3] Mathematically, this can be expressed as:

$$AEA\_Consumption = Family\_Consumption/Size^{X}$$

The magnitude of the equivalence scale variable—the size of x—is determined by the size of economies of scale in consumption (the degree to which the cost of consumption per person falls as household size increases). The size of the economies of scale assumed by the equivalence scale is inversely related to the value of x. If x is set at 1, it is assumed that there are no economies of scale in consumption. In many studies, the equivalence scale that is used is the square root of household size (where x=0.5) (see Buhman et al. 1988).

This report uses both the square-root rule (referred to as the mean per adult-equivalent) and a simple mean per capita estimate that assumes no economies of scale in consumption. The latter provides an upper limit on estimates of comparisons of the financial well-being of retirement-age and working-age households using the income measures estimated here.

This analysis focuses on before-tax income, but also provides estimates using after-tax income. Comparisons of before-tax income may provide a misleading picture of the financial well-being of retirement-age and working-age households if the proportion of income that is taxable and/or the marginal tax rate differ across types of income. Calculations of after-tax "potential" income require more assumptions than those of before-tax income (Appendix C, section 3), and may, therefore, have wider confidence intervals. To gauge how this might affect the results, the role of taxation is investigated as part of a sensitivity analysis in Appendix C, section 3.

---

3. See Nelson (1993), Buhman, et al. (1988), Phipps and Garner (1994), Smeeding and Rainwater (2004) as primary examples of this literature.

3 Descriptive statistics

The sample of households is divided into four types according to the age of the major income recipient (household head): working-age (ages 25 to 44 and ages 45 to 64) and retirement-age (ages 65 to 74 and ages 75 to 84).

3.1 Assets and liabilities

The composition of asset and debt holdings across the four household types is presented in Table 1.

Table 1
Mean value of assets and debts, by household type, 1999

	Working-age (25 to 44)		Working-age (45 to 64)		Retirement-age (65 to 74)		Retirement-age (75 to 84)	
	dollars per adult equivalent	percent	dollars per adult equivalent	percent	dollars per adult equivalent	percent	dollars per adult equivalent	percent
Assets								
Private pension assets	21,184	19.5	93,074	37.0	115,617	41.4	66,376	30.4
Other financial assets	8,740	8.1	25,724	10.2	42,327	15.2	54,195	24.8
Principal residence	44,592	41.1	73,598	29.2	74,948	26.8	69,037	31.6
Other real estate	7,750	7.1	17,956	7.1	15,469	5.5	8,474	3.9
Other non-financial assets	16,165	14.9	23,537	9.4	20,707	7.4	15,577	7.1
Equity in business	9,990	9.2	17,815	7.1	10,131	3.6	4,677	2.1
Total	108,423	100.0	251,705	100.0	279,200	100.0	218,337	100.0
Debts								
Mortgage on principal residence	21,504	71.6	15,772	60.4	3,133	46.3	1,186	59.4
Mortgage on other real estate	2,317	7.7	4,045	15.5	1,421	21.0	114	5.7
Other debt	6,218	20.7	6,283	24.1	2,215	32.7	694	34.8
Total	30,039	100.0	26,101	100.0	6,769	100.0	1,995	100.0

Note: All dollar values are per adult-equivalent amounts adjusted to account for economies of scale in larger households.
Source: Authors' calculations based on Survey of Financial Security (1999).

Households headed by seniors aged 65 to 74 have around $279,000 in total assets per adult-equivalent. The largest amount comes from pension assets ($115,617), followed by housing ($74,948), with lesser amounts from other financial assets ($42,327), other non-financial assets ($20,707), other real estate ($15,469), and equity in business ($10,131). Debt is relatively small at $6,769 per adult-equivalent, most of which comes from mortgages.

For households headed by individuals aged 45 to 64, total assets per adult-equivalent are $251,705, and total debt is $26,101. Private pension plans are the largest asset ($93,074), with housing second ($73,598). The proportional distribution of the other assets is similar to that for households headed by seniors aged 65 to 74.

In households headed by 25- to 44-year-olds, total assets are $108,423 per adult-equivalent, and total debt is $30,039. The principal residence makes up the largest share of the asset portfolio ($44,592). While the mortgage on the principal residence represents the largest component of debt for all household types, this is particularly so for the youngest households.

3.2 Income and net worth comparisons

Several descriptive statistics across the four household types analyzed in this study are presented in Table 2. Retirement-age households make up fewer than 20% of the households in the entire sample. Estimates of mean and median household income are significantly higher for

working-age than retirement-age households, particularly relative to those with a head aged 75 to 84. Mean household income per adult-equivalent is $37,258 for the 45 to 64 age group, $27,503 for those aged 65 to 74, and $23,736 for those aged 75 to 84.

On the other hand, estimates of net worth present a much more favourable picture of the financial situation of retirement-age households. Two definitions of net worth are used—one that includes the net value of the principal residence and one that does not.[4] Mean net worth of all assets (including the principal residence) increases from $220,144 for households with a head aged 45 to 64 to $265,563 for those headed by a senior aged 65 to 74, and then decreases to $212,111 for households headed by a senior aged 75 to 84. For the youngest households, mean net worth is much lower: $75,088.

Table 2
Selected characteristics, by household type, 1999

	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
Number (unweighted)	6,334	5,015	1,784	1,206
Percent of household units	47.83	33.93	11.22	7.01
	dollars per adult-equivalent			
Mean income	31,729	37,258	27,503	23,736
Median income	28,330	33,554	22,817	18,871
Net worth (excluding principal residence)				
Mean	51,472	162,190	193,709	144,261
Median	19,839	82,300	113,031	73,937
Net worth (including principal residence)				
Mean	75,088	220,144	265,563	212,111
Median	36,400	136,471	191,794	143,076

Source: Survey of Financial Security (1999).

Table 3 contains data on the distribution of income and net worth. The quintiles for income and net worth are first calculated for the whole population, and then each household type is distributed among the quintiles.

Retirement-age households are more likely than working-age households to occupy the bottom quintiles of the income distribution. By contrast, the bottom quintiles of the net worth distributions are disproportionately occupied by the youngest working-age households.

---

4. For both definitions, consumer durables such as vehicles are excluded. For more on differences in the consumption of durables both pre- and post-retirement, see Lafrance and LaRochelle-Côté (2011).

Table 3
Distribution of income and net worth, by household type, 1999

	Quintile				
	Bottom	Second	Third	Fourth	Top
	percent				
Income					
Working-age (25 to 44)	21	18	21	21	19
Working-age (45 to 64)	17	14	18	23	28
Retirement-age (65 to 74)	20	32	23	15	10
Retirement-age (75 to 84)	26	40	17	10	6
Net worth (excluding principal residence)					
Working-age (25 to 44)	27	27	24	15	6
Working-age (45 to 64)	15	13	17	24	31
Retirement-age (65 to 74)	11	12	14	24	38
Retirement-age (75 to 84)	11	16	18	26	28
Net worth (including principal residence)					
Working-age (25 to 44)	29	28	23	14	6
Working-age (45 to 64)	13	13	18	24	31
Retirement-age (65 to 74)	11	10	13	26	40
Retirement-age (75 to 84)	11	12	17	31	29

Source: Survey of Financial Security (1999).

4   Converting wealth to life incomes

The most common method of combining income and wealth into a single measure is to convert the stock of wealth into a flow and add that flow to current income (Wolff and Zacharias 2009).

For this analysis, wealth is translated into a flow by calculating the value of a lifetime annuity that could be purchased with that wealth. Financial institutions offer a range of options for doing this, one of which is an annuity that guarantees a fixed income stream until the death of the purchaser, or in the case of a couple, the last surviving spouse.

Two methods can be used to calculate the annuity rate—that is, the percentage of the asset that will be paid in income annually. The first employs a formula that exhausts the total amount of wealth at death, based on the interest rate that can be expected to be earned on the asset and a projection of life expectancy. The second uses market quotations for annuities.

The former has the advantage of simplicity, requiring only an expected interest rate and life expectancy. The major disadvantage is that the annuity rates do not take into account transaction costs—the fees that the buyer of an annuity has to pay. To overcome this problem, annuity rates in existing markets could be used, but this requires a representative set of quotations. That, too, is problematic because the companies that offer these quotations know that most people who buy annuities are healthier than normal, and therefore, the quotations are for a population that does not represent the average individual in each age group.[5]

The first method will be used here. The results are compared with those yielded by quotations later in this section. The two different methods yield similar results.

An annuity rate of interest (w) can be derived by the following formula:

$$w = \left[(1+r)^{T-1} r\right] / \left[(1+r)^{T} - 1\right]$$

---

5. Based on personal communications from representatives of the life insurance industry.

where:

T = life expectancy of the longest-living spouse
r = interest rate expected to be earned on the asset

Life expectancy (T) is taken from the life tables published by Statistics Canada (2006). For couples, the spouse with the longer remaining life expectancy (surviving spouse) is used.

The interest rate that is used is the real rate of return on long-term Government of Canada bonds in the late 1990s. The baseline specification assumes a 3% constant return, but sensitivity tests using interest rates ranging from 1.5% to 5% are performed (Appendix C, section 1).

When calculating the wealth-adjusted stream of income, it is important not to double-count income from assets owned by the household. Assets already yielding income, especially pension assets, should not be further annuitized. Fortunately, the 1999 SFS indicates the various sources of household income derived from assets, and where appropriate, these are subtracted from income estimates before the annuitized stream from net worth is added to income (see Appendix B).

As mentioned previously, two definitions of net worth are used—excluding and including the value of the principal residence. The procedure described above is first applied to the net worth definition that excludes the value of the principal residence. The annuity income calculated from the formula is added to the actual household income to provide a first set of wealth-adjusted estimates of potential income.

To incorporate the income stream that can be derived from the principal residence, an alternative method is employed that does not liquidate the dwelling immediately, since the implicit income from home ownership is already included in income.[6] A principal residence produces both a stream of services over the owner's lifetime and an asset available for disposition at a later date. Individuals can continue to live in their residence, thereby providing themselves with housing services in lieu of paying rent, and at the same time, sell the residence via a reverse mortgage (or other financial transaction) that provides a lump sum that can, in turn, be annuitized.

Income that can be derived from annuitizing the equity in a home (for instance, from a reverse mortgage)[7] is also added to the income of retirement-age households to produce a second set of wealth-adjusted estimates of potential income.

All estimates are calculated on a before-tax basis, although a brief illustration of the impact of using after-tax comparisons follows. The role of taxation is part of the sensitivity analysis in Appendix C.

---

6. As part of the sensitivity analysis in Appendix C, results are also presented that assume households sell their principal residence and convert the proceeds into a lifetime annuity (taking into account that these households would need to rent). This alternative is found to be less advantageous.
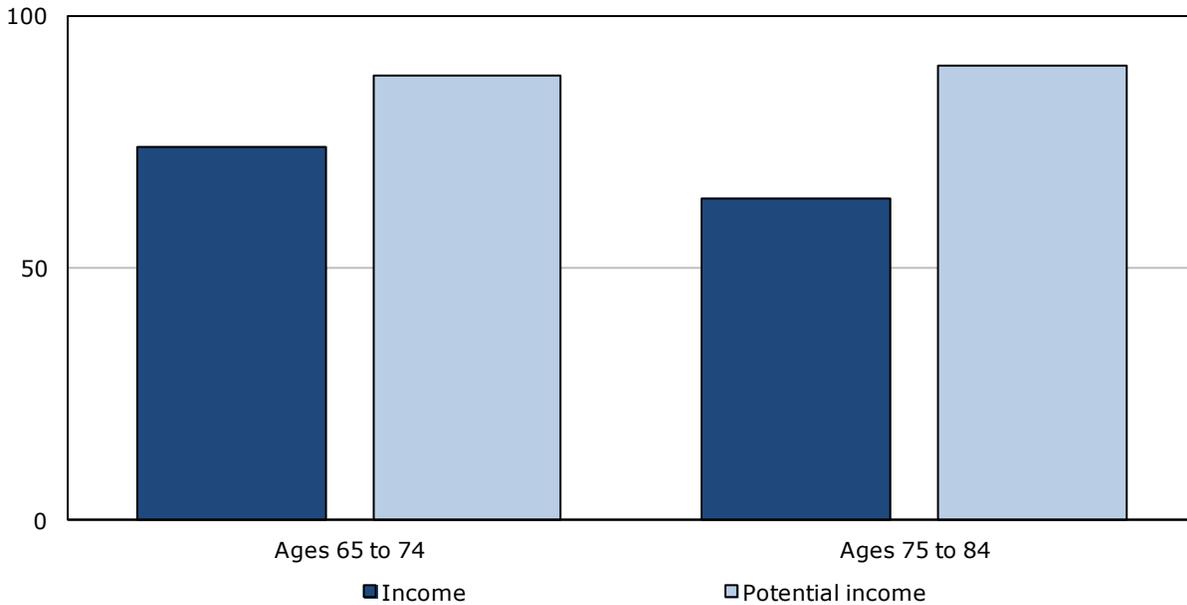7. The reverse mortgage calculation is outlined in Appendix A.

5   Results

5.1   Income levels

5.1.1   Before-tax calculations

The means of unadjusted income and wealth-adjusted income are compared in Table 4.[8] The first row contains the unadjusted income estimates derived from the survey. The second adds implicit income from owner-occupied housing. The third adds the annuitized value of non-housing wealth, and the fourth, the annuitized value of housing wealth.[9] The estimates of annuitized income derived from non-housing and housing wealth are added only for retirement-age households; working-age households are considered to be accumulating assets to draw upon in retirement. Therefore, comparisons across household types should focus on the wealth-adjusted income of retirement-age households and the actual income of working-age households.

Accounting for wealth increases the incomes of retirement-age households regardless of the age of the household head, but to different degrees. For those headed by 65- to 74-year-olds, mean income increases by 12% when implicit income from owner-occupied housing is added, by another 8% when the annuitized value of non-housing wealth is added, and by another 9% when the annuitized value of the principal residence is added, for a total of 29% overall. For households headed by 75- to 84-year-olds, the total increase is 53%.

Table 4
Mean unadjusted and wealth-adjusted income, by household type, 1999

Mean income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per adult-equivalent			
Unadjusted	31,729	37,258	27,503	23,736
Including implicit income from principal residence	32,960	40,128	30,711	26,796
Wealth-adjusted (excluding net value of principal residence)	...	...	33,025	32,215
Wealth-adjusted (including net value of principal residence)	...	...	35,387	36,206

Source: Survey of Financial Security (1999).

To analyze income differences across household types, the potential income of retirement-age households is compared with the actual income (adjusted for implicit income associated with home ownership) of working-age households.

---

8. The use of medians for comparison yields results similar to those of means. Appendix C contains a reproduction of Table 4 using medians.
9. The total effect of home ownership is the difference between lines 1 and 2 (the implicit income from home ownership or the savings on rent) plus the difference between lines 3 and 4 (the annuitized value of the dwelling derived from a reverse mortgage).

Chart 1
Retirement-age households' before-tax income and potential income relative to working-age (45 to 64) households, by age of household head, 1999

percent

Source: Survey of Financial Security (1999).

The impact of considering seniors' potential income from different sources of wealth is considerable. Without any adjustments, the mean income per adult-equivalent in households headed by 65- to 74-year-olds is 74% of that in households headed by 45- to 64-year-olds. When the implicit income from owner-occupied housing is added for both household types, the ratio becomes 77%. When the annuitized value of non-housing wealth is added to retirement-age household income, the ratio rises to 82%, and when the annuitized value of housing wealth is included, it rises to 88% (Chart 1).

These comparisons all use the adult-equivalence scale that divides by the square root of household size to take economies of scale into account. If simple per capita comparisons are used (Appendix C, Table C10), the relative financial well-being of households with a head aged 65 to 74 increases even more. Their mean income per capita rises from 86% to 104% of that of households headed by 45- to 64-year-olds when all sources of potential income are considered.

5.1.2   Sensitivity to interest rates

The annual value of an annuity is sensitive to the interest rate underlying the calculations. To test the sensitivity of the results, bounds of 1.5% and 5% were chosen—a range of +/- 50% of the base interest rate used (Appendix C). The annuity interest rate derived from the formula for these two baseline specifications ranges from 5.6% to 7.5% for retirement-age households (the lower and upper bounds).

The estimated annuity represents a theoretical possibility, not the commercial reality of purchasing an annuity in Canada. Expenses, profit margins and adverse mortality selection might reduce annuity income by 10% or more (Hamilton, 2009). However, the estimates used in this analysis are similar to those used by others. Hamilton (2009) suggests an annuity rate of 7.8%

for a 65-year-old couple.[10] A commercial quote from the current (April 2011) Canadian market is 6.1% on a joint life annuity for 65-year-olds.

Chart 2
Retirement-age households' potential before-tax income relative to working-age (45 to 64) households, by interest rate and age of household head, 1999

percent
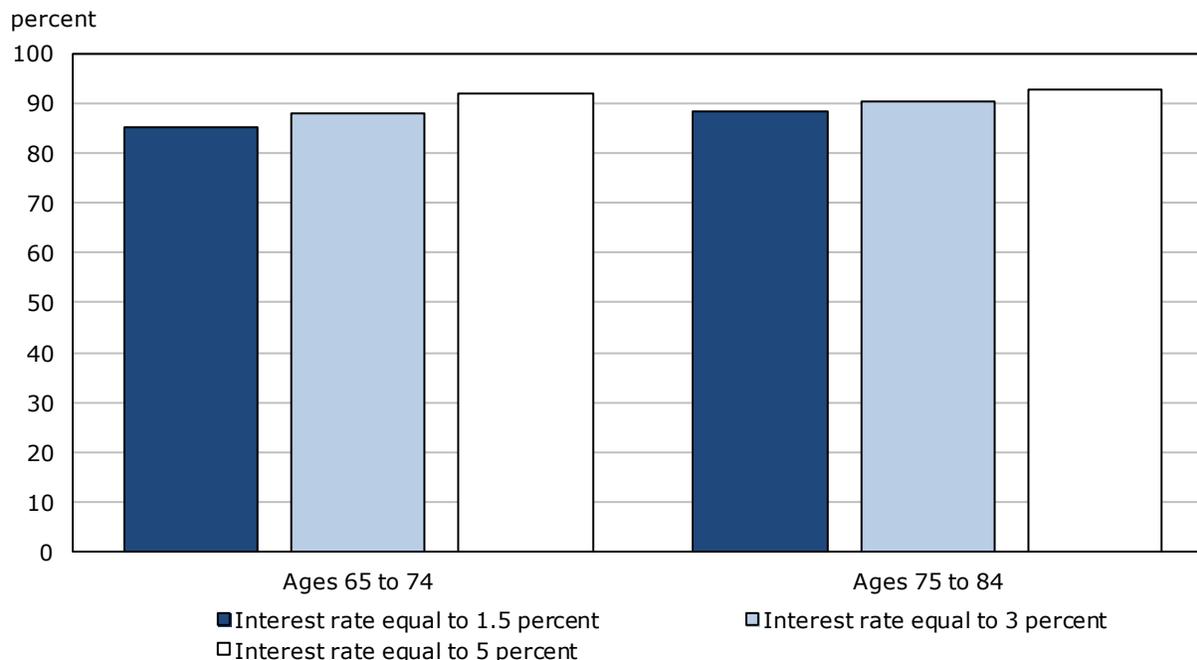
Source: Survey of Financial Security (1999).

Based on the 5% rate of return and the 7.5% annuity rate, the relative income ratio using the adult equivalency scale for households headed by 65- to 74-year-olds increases from the 88% produced by the benchmark estimate to 92%; the increase for households headed by 75- to 84-year-olds is from 90% to 93% (Chart 2).

5.1.3   After-tax calculations

The previous estimates represent before-tax income; but after-tax income may more closely approximate resources available to support household expenditures.

Using after-tax income and the square-root equivalence scale improves the financial position of retirement-age households relative to the before-tax calculations (Appendix C, Table C7). On an after-tax basis, the mean income per adult-equivalent of households headed by 65- to 74-year-olds is 79% of that of working-age households headed by 45- to 64-year-olds. The percentage rises to 81% when the implicit income from owner-occupied housing is added. When non-housing wealth is considered for retirement-age households, this increases to 95%, and when housing wealth is added, to 105% (Chart 3).

---

10. Where the benefits are reduced by one-third after the death of the first spouse.

Chart 3
Retirement-age households' potential before- and after-tax income relative to working-age (45 to 64) households, by age of household head, 1999

percent
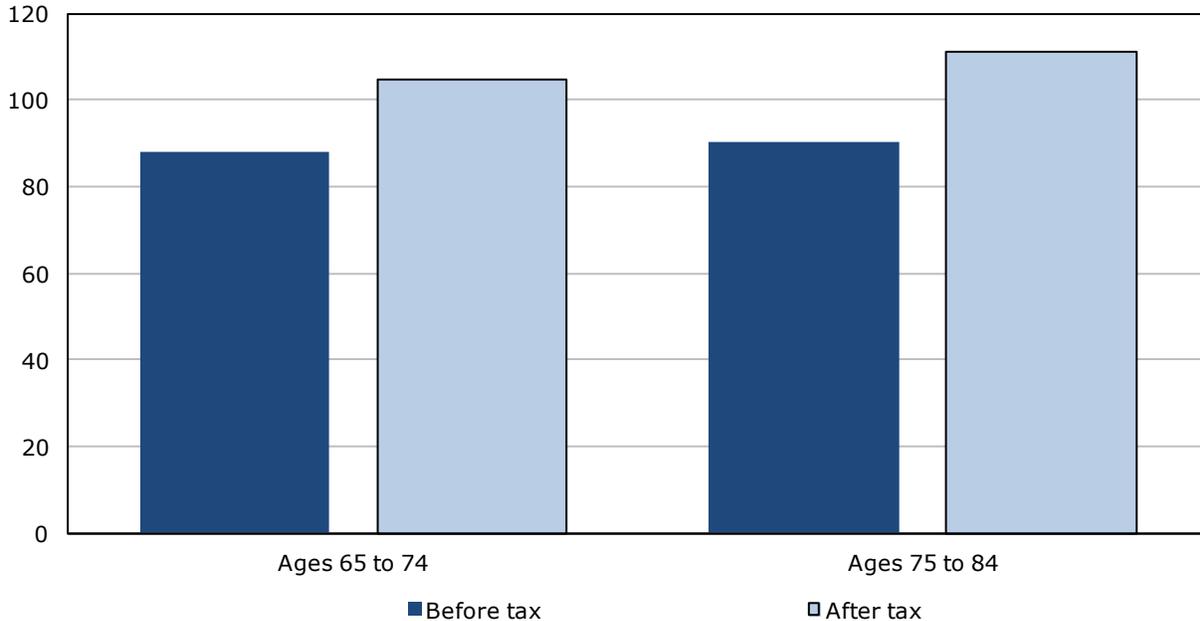
Source: Survey of Financial Security (1999).

The use of per capita calculations rather than per adult-equivalent calculations and after-tax income (Appendix C, Table C11) improves the relative position of households headed by 65- to 74-year-olds even more—from 92% and 100% without and with implicit housing income, to 114% when non-housing wealth is considered, and to 124% when housing wealth is also considered.

5.2   Income distributions

Previous sections have examined how a different concept of income—potential income—affects the average income of a group. However, it also affects the distribution of income within a group.

A more detailed look at the distributional changes is provided in Table 5, where the distribution among income quintiles is estimated for the four household types, using the adult-equivalent calculations. Each row sums to 100.

The income distribution of retirement-age households (especially those headed by 75- to 84-year-olds) is less skewed when adjustments for wealth are included in the calculations. Based only on income, 66% of older retirement-age households fall in the two bottom quintiles. When assets other than housing are included, the figure is reduced to 60%, and when housing assets are considered, 45%. Modifying the income concept has much less effect on the income distribution of working-age households.

Table 5
Distribution of unadjusted and wealth-adjusted before-tax household income, by household type, 1999

Before-tax income	Quintile				
	Bottom	Second	Third	Fourth	Top
			percent		
Unadjusted					
Working-age (25 to 44)	21	18	21	21	19
Working-age (45 to 64)	17	14	18	23	28
Retirement-age (65 to 74)	20	32	23	15	10
Retirement-age (75 to 84)	26	40	17	10	6
Including implicit income from principal residence					
Working-age (25 to 44)	23	19	20	20	18
Working-age (45 to 64)	17	14	18	23	29
Retirement-age (65 to 74)	17	31	25	16	11
Retirement-age (75 to 84)	23	40	19	11	7
Wealth-adjusted (excluding net value of principal residence)					
Working-age (25 to 44)	21	19	22	21	17
Working-age (45 to 64)	17	14	18	22	29
Retirement-age (65 to 74)	22	32	21	13	12
Retirement-age (75 to 84)	24	36	17	12	11
Wealth-adjusted (including net value of principal residence)					
Working-age (25 to 44)	24	21	20	21	15
Working-age (45 to 64)	16	15	17	22	30
Retirement-age (65 to 74)	17	28	25	15	15
Retirement-age (75 to 84)	18	27	25	15	15

Source: Survey of Financial Security (1999).

Charts 4 to 7 show that the effect of the adjustment for wealth on the financial status of retirement-age households is greater when the value of the principal residence is included. The within-group distribution of working-age households headed by 25- to 44-year-olds is only marginally affected by the wealth adjustment. The distribution of working-age households headed by 45- to 64-year-olds is affected slightly more, but much less so than for retirement-age households.[11]

---

11. The Kolmogorov-Smirnov test was used for equality of distributions. In all four cases, the wealth-adjusted income distributions contain significantly larger values than the unadjusted distributions, with the largest difference for senior households when all assets are included.

Chart 4
Distribution of working-age (25 to 44) households' unadjusted and wealth-adjusted income, 1999

Density
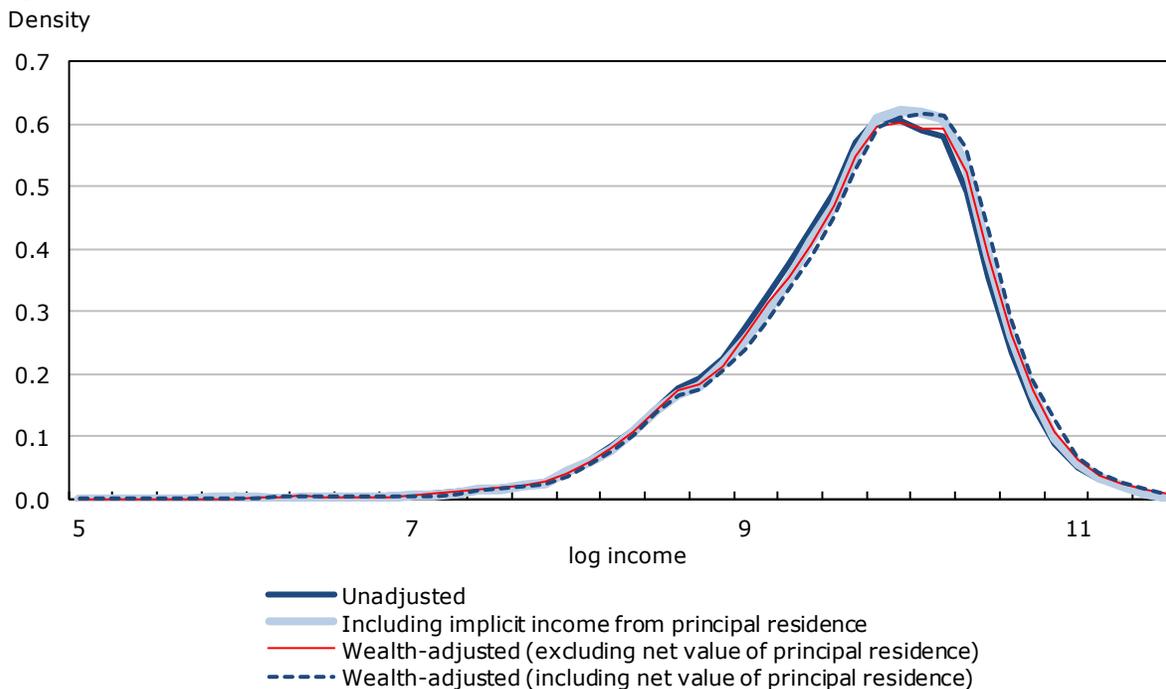
Source: Survey of Financial Security (1999).

Chart 5
Distribution of working-age (45 to 64) households' unadjusted and wealth-adjusted income, 1999

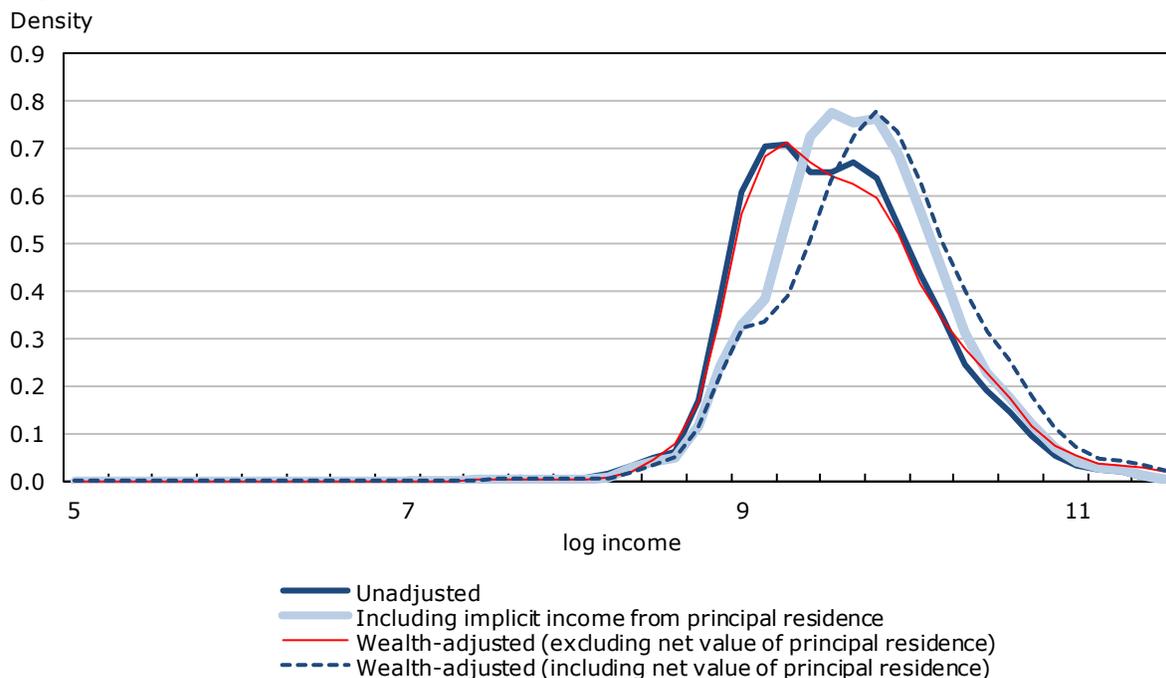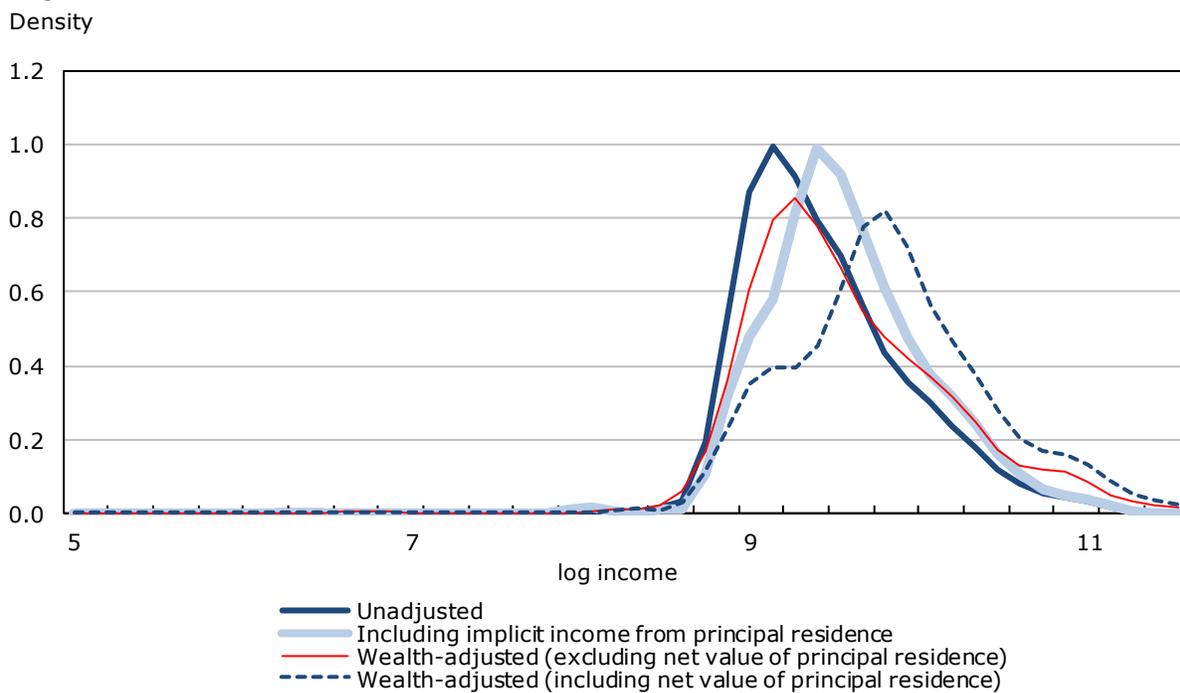Density
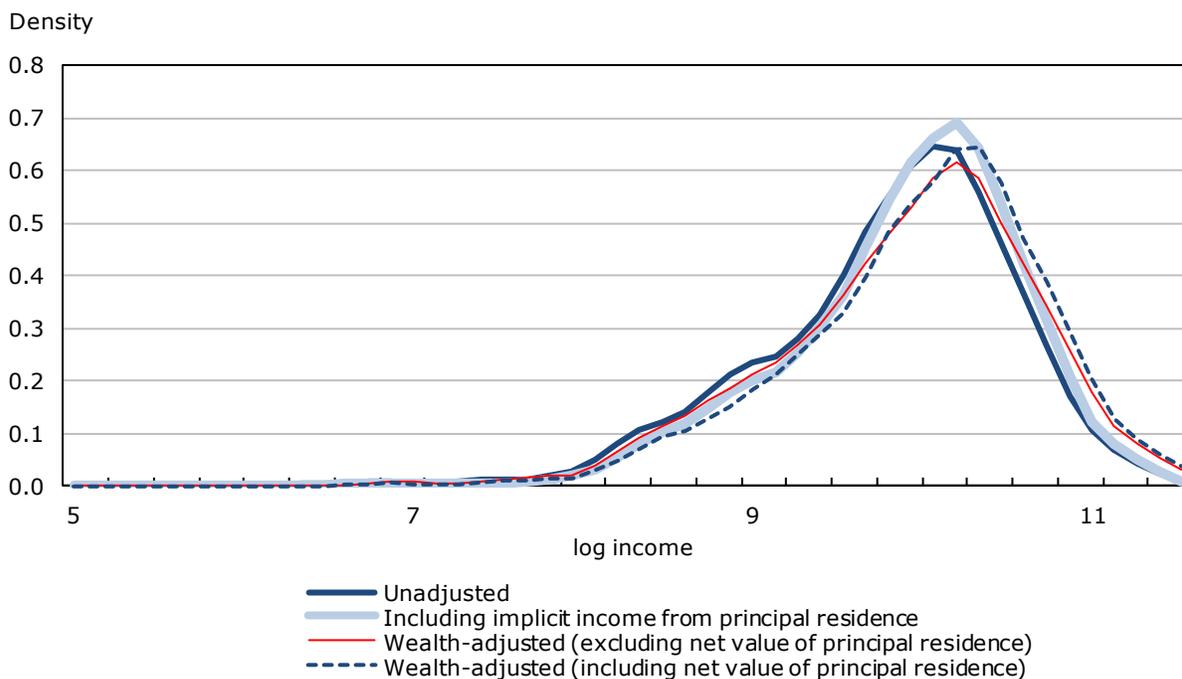
Source: Survey of Financial Security (1999).

Chart 6
Distribution of retirement-age (65 to 74) households' unadjusted and wealth-adjusted income, 1999

Density

Source: Survey of Financial Security (1999).

Chart 7
Distribution of retirement-age (75 to 84) households' unadjusted and wealth-adjusted income, 1999

Density

Source: Survey of Financial Security (1999).

The quintile mobility matrices in Tables 6 and 7 compare the income distributions of retirement-age households that result from the annuitization of wealth, with the distributions based on their actual incomes. The cells contain the percentage of households in each wealth-adjusted quintile, given the quintile of origin in the actual income distribution. For example, 40% of the households headed by 65- to 74-year-olds that were in the bottom quintile based on their actual income move up at least one quintile when all sources of wealth are included as annuities; this is the case for more than 50% of households headed by 75- to 84-year-olds.

Table 6
Transition matrices of retirement-age households (65 to 74), income, 1999

	Wealth-adjusted (excluding net value of principal residence)					Wealth-adjusted (including net value of principal residence)				
	Quintile					Quintile				
	Bottom	Second	Third	Fourth	Top	Bottom	Second	Third	Fourth	Top
	percent									
Quintile of origin										
Bottom	78	17	3	1	1	60	30	7	2	1
Second	17	67	10	4	1	14	52	25	6	3
Third	4	25	55	12	4	2	19	50	22	7
Fourth	2	9	31	41	17	2	8	25	42	24
Top	1	2	6	21	70	1	0	6	15	78

Source: Survey of Financial Security (1999).

Table 7
Transition matrices of retirement-age households (75 to 84), income, 1999

	Wealth-adjusted (excluding net value of principal residence)					Wealth-adjusted (including net value of principal residence)				
	Quintile					Quintile				
	Bottom	Second	Third	Fourth	Top	Bottom	Second	Third	Fourth	Top
	percent									
Quintile of origin										
Bottom	69	23	6	1	0	49	30	17	3	1
Second	11	62	16	8	2	14	40	31	10	6
Third	6	24	39	21	9	1	16	39	31	14
Fourth	2	10	16	38	34	1	3	15	39	42
Top	0	2	6	9	83	0	2	5	9	84

Source: Survey of Financial Security (1999).

6   Conclusion

Studies of post-retirement financial well-being have tended to focus on two measures—consumption and income—that can provide contrasting pictures. As households move into retirement, some expenditures fall, but others tend to rise, so consumption remains relatively steady (Lise 2003; Lafrance and LaRochelle-Côté 2011). This compares with an 85% replacement rate in total income "per" adult.

However, the gap narrows or disappears when potential post-retirement resources available to finance consumption are examined. This "potential income" is the sum of income as usually measured and income that could be realized from owned assets such as mutual funds and housing.

In this analysis, the income that could be generated if households liquidated their assets and purchased an annuity[12] is added to actual income of retirement-age households. The results show the "potential" income of retirement-age households to be much closer to that of working-age households than are conventional measures of income. The inclusion of net-wealth-annuitized values in retirement-age households' income substantially increases their relative financial status, with about half of this increase coming from the benefits of housing, as savings on rent and as realization of part of the wealth in the home from a reverse mortgage. For instance, the mean before-tax income per adult-equivalent in households headed by 65- to 74-year-olds is 77% of that in households headed by 45- to 64-year-olds. But when non-housing wealth and housing wealth are included, this increases to 88%.

On an after-tax basis, the picture for retirement-age households is even more favorable. The mean after-tax income per adult-equivalent in households headed by 65- to 74-year-olds is 79% of that of households headed by 45- to 64-year-olds. When non-housing and housing wealth are considered, this increases to 105%.

The calculations presented here rely on survey data and require specific assumptions (about interest rates, longevity, and the reverse mortgage market). In principle, they should have confidence intervals attached to them. This paper, however, does not provide confidence intervals. The purpose is not to indicate the exact amount by which "potential" income exceeds actual income. Instead, the aim is to demonstrate how sensitive the findings are to alternate assumptions. Although the actual amounts of potential income vary according to the assumptions used, the result that consistently emerges is that retirement-age households, on average, have saved enough to maintain a relatively constant income stream. Moreover, once taxes are taken into account, they appear to have a small cushion.

It must be stressed that the calculations rely on data from the 1999 SFS, which is now more than a decade old. Household wealth and financial markets have changed since then. Future research will make use of the 2005 SFS and the 2012 SFS to examine whether potential income has changed over time.

---

12. In the case of housing, it is assumed that homeowners continue to live in their homes, but purchase an annuity with a reverse mortgage.

Appendix A Reverse mortgage calculation

A reverse mortgage is a loan designed for homeowners aged 60 or older. It is secured by the equity in the home, which is the portion of the home's value that is debt-free. It allows homeowners to obtain cash without having to sell their home. The loan usually amounts to 10% to 40% of the current value of the dwelling.[13]

To estimate the lump sum that a reverse mortgage can provide, it is assumed that the maximum value of the loan is based on 75% of the expected value of the home at the death of the homeowner, after allowing for an annual 2% appreciation.[14] The present-day loan is then calculated using a deferred payment method that includes interest as well as principal.

The loan obtained from the reverse mortgage is assumed to be invested in a life annuity to produce an annual income stream until death of the homeowner. This annuity is derived using the formula in the main text.

The interest rate on the loan via reverse mortgage is assumed to be higher than the rate used in the derivation of the annuity (2 percentage-point spread).

---

13. Financial Consumer Agency of Canada: www.fcac-acfc.gc.ca/eng/publications/tipsheets/tsshoprmort-eng.asp
14. Canada Mortgage and Housing Corporation:
    http://www.cmhc- schl.gc.ca/en/inpr/afhoce/tore/afhoid/fite/remo/index.cfm

Appendix B Avoiding double-counting of income from assets

Some of the assets owned by a household, notably pension assets, generate income. When calculating the wealth-adjusted stream of income, it is important not to double-count the income derived from these assets.

The Survey of Financial Security identifies the various sources of household income. To avoid double-counting in this analysis, the following components are subtracted from total income:

(i) retirement income from:

- employer pensions for the reference year,
- RRSP annuities
- RRIF withdrawals
- other pensions and superannuation

(ii) property/investment income from:

- rental properties
- dividends
- interest
- other investment income
- net partnership income

After these amounts are subtracted, the income stream derived by the annuitization of the household's net worth is added to the remaining income to obtain the adjusted income streams reported in this paper.

Appendix C Sensitivity analysis

1 Variation in the interest rate

The baseline specification used in the paper assumes a 3% constant return. This appendix replicates the analysis using 1.5% as the lower bound and 5% as the upper bound of the interest rate in order to test the sensitivity of the results to changes in the assumption. The tables below show that the main conclusions are robust, regardless of the choice of interest rate.

Table C1
Mean unadjusted and wealth-adjusted income, by household type, interest rate = 1.5 percent, 1999

Mean income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per adult-equivalent			
Unadjusted	31,729	37,258	27,503	23,736
Including implicit income from principal residence	32,960	40,128	30,711	26,796
Wealth-adjusted (excluding net value of principal residence)	...	...	31,525	31,187
Wealth-adjusted (including net value of principal residence)	...	...	34,232	35,537

Source: Survey of Financial Security (1999).

Table C2
Mean unadjusted and wealth-adjusted income, by household type, interest rate = 5 percent, 1999

Mean income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per adult-equivalent			
Unadjusted	31,729	37,258	27,503	23,736
Including implicit income from principal residence	32,960	40,128	30,711	26,796
Wealth-adjusted (excluding net value of principal residence)	...	...	34,998	33,628
Wealth-adjusted (including net value of principal residence)	...	...	36,966	37,187

Source: Survey of Financial Security (1999).

Table C3
Distribution of unadjusted and wealth-adjusted income, by household type, interest rate = 1.5 percent, 1999

Income	Quintile				
	Bottom	Second	Third	Fourth	Top
			percent		
Unadjusted					
Working-age (25 to 44)	21	18	21	21	19
Working-age (45 to 64)	17	14	18	23	28
Retirement-age (65 to 74)	20	32	23	15	10
Retirement-age (75 to 84)	26	40	17	10	6
Wealth-adjusted (excluding net value of principal residence)					
Working-age (25 to 44)	21	18	22	21	17
Working-age (45 to 64)	17	14	17	22	29
Retirement-age (65 to 74)	23	33	21	12	10
Retirement-age (75 to 84)	23	38	18	12	10
Wealth-adjusted (including net value of principal residence)					
Working-age (25 to 44)	23	20	20	21	16
Working-age (45 to 64)	16	16	17	22	29
Retirement-age (65 to 74)	17	28	26	15	14
Retirement-age (75 to 84)	18	26	27	15	15

Source: Survey of Financial Security (1999).

Table C4
Distribution of unadjusted and wealth-adjusted income, by household type, interest rate = 5 percent, 1999

Income	Quintile				
	Bottom	Second	Third	Fourth	Top
			percent		
Unadjusted					
Working-age (25 to 44)	21	18	21	21	19
Working-age (45 to 64)	17	14	18	23	28
Retirement-age (65 to 74)	20	32	23	15	10
Retirement-age (75 to 84)	26	40	17	10	6
Wealth-adjusted (excluding net value of principal residence)					
Working-age (25 to 44)	21	19	22	21	16
Working-age (45 to 64)	16	14	18	22	30
Retirement-age (65 to 74)	23	30	22	13	13
Retirement-age (75 to 84)	24	35	17	12	12
Wealth-adjusted (including net value of principal residence)					
Working-age (25 to 44)	24	21	20	20	15
Working-age (45 to 64)	16	15	17	22	30
Retirement-age (65 to 74)	17	28	24	16	15
Retirement-age (75 to 84)	19	27	25	14	14

Source: Survey of Financial Security (1999).

2 Alternative account of house value

This section provides an alternate method of deriving the potential income arising from housing equity. Here, it is assumed that households sell their dwelling (rather than taking out a reverse mortgage) and convert the proceeds into a lifetime annuity. Because these households would then need to rent, the income they receive is obtained by estimating the difference between the

value of the income stream derived from this annuity and the implicit rental service from their property. Imputed rents, by housing value, are taken from Brown et al. (2010).

Tables C5 and C6 show that the results are not very sensitive to this assumption. Taking housing into account still significantly increases the relative financial position of retirement-age households, although the effect is slightly smaller.

Table C5
Mean and median unadjusted and alternative wealth-adjusted income, by household type, 1999

Income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per adult-equivalent			
Unadjusted				
Mean	31,729	37,258	27,503	23,736
Median	28,330	33,554	22,817	18,871
Wealth-adjusted (alternative account of house value)				
Mean	33,325	42,681	31,946	33,372
Median	29,485	37,273	25,455	25,193

Source: Survey of Financial Security (1999).

Table C6
Distribution of unadjusted and alternative wealth-adjusted income, by household type, 1999

Income	Quintile				
	Bottom	Second	Third	Fourth	Top
	percent				
Unadjusted					
Working-age (25 to 44)	21	18	21	21	19
Working-age (45 to 64)	17	14	18	23	28
Retirement-age (65 to 74)	20	32	23	15	10
Retirement-age (75 to 84)	26	40	17	10	6
Wealth-adjusted (alternative account of house value)					
Working-age (25 to 44)	22	20	21	21	16
Working-age (45 to 64)	17	15	17	22	29
Retirement-age (65 to 74)	21	29	23	14	13
Retirement-age (75 to 84)	19	32	21	13	15

Source: Survey of Financial Security (1999).

3 After-Tax Income

The after-tax values of the income measures are obtained as follows:

(i) Income taxes, which should be deducted from total income, are derived by calculating the median tax rate for each of the four household types at different income ranges.[15] These tax rates are applied to the taxable portion of the wealth-adjusted income.

(ii) The housing services obtained from Brown et al. (2010) are considered as non-taxable income.

(iii) The annuity derived from the home equity (via reverse mortgage) is only partially taxed. The taxable portion is determined by an "exclusion ratio" obtained by dividing the value of the home

---

15. The process starts from a lowest income range of $0 to $15,000 and then creates successive ranges by increments of $20,000 up to the top range of $115,000 or more. The estimated median tax rates range from 0% for the lowest income level (for all age groups) to 30% to 34% for the highest income level (depending on the age group).

equity by the present value of the total amount of annuities that will be paid to the households over their lifetime.[16]

(iv) The annuity payments obtained from liquidating non-housing assets are assumed to be taxable in their entirety. This is because the assets when liquidated will face some capital gains taxes, but the amount is difficult to calculate. To compensate for the overestimation of the amount available for purchasing an annuity, the tax rate is not reduced as it is for housing (where capital gains taxes are less important or non-existent in most cases).

For seniors, additional calculation steps are required. Old Age Security (OAS) and Guaranteed Income Supplement (GIS) benefits are subtracted from gross total income. The taxable portion of the income stream obtained from annuitizing net worth is then added. Given the resulting gross income levels, the OAS/GIS payments to which each household is entitled are then adjusted.[17] The tax rates are applied to the totals obtained (excluding GIS).

Tables C7 and C8, which replicate Tables 4 and 5 using after-tax income, show that the changes across the distributions from income to wealth-adjusted income are more favourable to senior households. Taking taxation into account reinforces the main results obtained on a before-tax basis.

Table C7
Mean unadjusted and wealth-adjusted after-tax income, by household type, 1999

Mean after-tax income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per adult-equivalent			
Unadjusted (as reported by survey respondents)	25,670	29,539	23,356	20,780
Unadjusted (using median tax rates by group and imputed OAS/GIS[1])	25,971	29,750	23,652	21,249
Including implicit income from principal residence	27,193	32,565	26,345	23,589
Wealth-adjusted (excluding net value of principal residence)	...	...	31,054	31,584
Wealth-adjusted (including net value of principal residence)	...	...	34,126	36,160

1. OAS/GIS: Old Age Security, Guaranteed Income Supplement.
Source: Survey of Financial Security (1999).

---

16. Applying this exclusion ratio is taken from *Retirement Savings Adequacy of Canadians: Accounting for All Assets*, Finance.
17. More specifically, OAS amounts are reduced at 15% rate for taxable income above $53,215. OAS payments are set to 0 when income is high enough that the above adjustment results in a negative number. GIS benefits are reduced by 50% of taxable income and set to 0 when income is high enough to make the household ineligible for GIS.

Table C8
Distribution of unadjusted and wealth-adjusted after-tax household income, by household type, 1999

After-tax income	Quintile				
	Bottom	Second	Third	Fourth	Top
	percent				
Unadjusted (as reported by survey respondents)					
Working-age (25 to 44)	22	19	21	20	19
Working-age (45 to 64)	18	14	17	23	28
Retirement-age (65 to 74)	18	31	25	16	11
Retirement-age (75 to 84)	22	41	19	12	6
Unadjusted (using median tax rates by group and imputed OAS/GIS[1])					
Working-age (25 to 44)	21	19	21	20	19
Working-age (45 to 64)	19	14	18	22	28
Retirement-age (65 to 74)	17	32	23	17	11
Retirement-age (75 to 84)	22	40	20	12	7
Wealth-adjusted (excluding net value of principal residence)					
Working-age (25 to 44)	24	18	21	21	16
Working-age (45 to 64)	18	15	17	21	29
Retirement-age (65 to 74)	14	34	24	16	13
Retirement-age (75 to 84)	10	40	21	15	14
Wealth-adjusted (including net value of principal residence)					
Working-age (25 to 44)	27	20	19	19	14
Working-age (45 to 64)	16	16	18	21	29
Retirement-age (65 to 74)	8	27	27	21	17
Retirement-age (75 to 84)	7	26	26	22	20

1. OAS/GIS: Old Age Security, Guaranteed Income Supplement.
Source: Survey of Financial Security (1999).

4   Calculations using number of family members to derive adult-equivalent scale.

This section reproduces Tables 2, 4 and C7 using the number of household members rather than the square root of the number of household members for comparisons across age groups. This technique implicitly assumes no economies of scale in consumption.

Table C9
Reproduction of Table 2. Selected characteristics per capita, by household type, 1999

	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
Number (unweighted)	6,334	5,015	1,784	1,206
Percent of household units	47.83	33.93	11.22	7.01
	dollars per capita			
Mean income	21,535	25,184	21,734	19,719
Median income	17,204	21,267	17,457	15,866
Net worth (excluding net value of principal residence				
Mean	33,358	112,719	153,253	119,738
Median	12,329	52,932	84,975	64,501
Net worth (including net value of principal residence)				
Mean	47,702	151,784	210,172	177,013
Median	21,967	85,584	142,836	122,160

Source: Survey of Financial Security (1999).

Table C10
Reproduction of Table 4. Mean unadjusted and wealth-adjusted income per capita, by household type, 1999

Mean income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per capita			
Unadjusted	21,535	25,184	21,734	19,719
Including implicit income from principal residence	22,331	27,186	24,310	22,319
Wealth-adjusted (excluding net value of principal residence)	...	...	26,258	27,113
Wealth-adjusted (including net value of principal residence)	...	...	28,176	30,563

Source: Survey of Financial Security (1999).

Table C11
Reproduction of Table C7. Mean unadjusted and wealth-adjusted after-tax income per capita, by household type, 1999

Mean after-tax income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per capita			
Unadjusted (as reported by survey respondents)	17,401	19,984	18,475	17,284
Unadjusted (using median tax rates by group and imputed OAS/GIS[1])	14,424	17,450	15,805	15,078
Including implicit income from principal residence	18,614	22,298	21,031	19,810
Wealth-adjusted (excluding net value of principal residence)	...	...	25,310	27,159
Wealth-adjusted (including net value of principal residence)	...	...	27,710	31,017

1. OAS/GIS: Old Age Security, Guaranteed Income Supplement.
Source: Survey of Financial Security (1999).

5 Median income levels

Table C12 reproduces Table 4 using medians rather than means. Based on medians, the income of households headed by 65- to 74-year-olds increases 31% overall when the annuitized value of the principal residence is taken into account, which is almost identical to the results obtained using mean income levels.

Table C12
Median unadjusted and wealth-adjusted income, by household type, 1999

Median income	Working-age (25 to 44)	Working-age (45 to 64)	Retirement-age (65 to 74)	Retirement-age (75 to 84)
	dollars per adult-equivalent			
Unadjusted	28,330	33,554	22,817	18,871
Including implicit income from principal residence	29,495	36,675	23,441	21,318
Wealth-adjusted (excluding net value of principal residence)	...	...	26,946	24,747
Wealth-adjusted (including net value of principal residence)	...	...	29,808	29,240

Source: Survey of Financial Security (1999).

7   References

Brown, M., F. Hou, and A. Lafrance. 2010. *Incomes of Retirement-age and Working-age Canadians: Accounting for Home Ownership*. Statistics Canada catalogue no. 11F0027M. Economic Analysis Research Papers. No.64. Ottawa.

Buhmann, B., L. Rainwater, G. Schmaus, and T.M. Smeeding. 1988. "Equivalence scales, well-being, Inequality, and poverty: Sensitivity estimates across ten countries using the Luxembourg Income Study (LIS) Database." *Review of Income and Wealth*. Vol. 34. No. 2. p. 115–142.

Hamilton, M. 2009. *Longevity Risk from Three Perspectives*. Ottawa, Ontario. Department of Finance.

Hou, F. 2010. "The impact of age, income, and family structure on home ownership." *Canadian Economic Observer*. Statistics Canada catalogue no. 11-010-X. Vol. 23. No. 2.

Lafrance, A., and S. Larochelle-Côté. 2011. *Consumption Patterns Among Aging Canadians: A Synthetic Cohort Approach*. Statistics Canada catalogue no. 11F0027M. Ottawa, Ontario. Economic Analysis Research Papers. No.67.

Lise, J. 2003. *Is Canada's Retirement Income System Working?* Ottawa, Ontario. Working Papers-Department of Finance Canada. No. 2003-02.

LaRochelle-Côté, S., G. Picot, and J. Myles. 2008. *Income Security and Stability During Retirement in Canada*. Statistics Canada catalogue no. 11F0019M. Ottawa, Ontario. Analytical Studies Research Paper Series. No. 306.

Mintz, J.M. 2009. *Summary Report on Retirement Income Adequacy Research*. Ottawa, Ontario. Department of Finance.

Nelson, J. A. 1993. "Household Equivalence Scales: Theory versus Policy?" *Journal of Labor Economics*. Vol. 11. No. 3. p. 471–493.

Ostrovsky, Y., and G. Schellenberg. 2009. *Pension Coverage, Retirement Status, and Earnings Replacement Rates Among a Cohort of Canadian Seniors*. Statistics Canada catalogue no. 11F0019M. Ottawa, Ontario. Analytical Studies Research Paper Series. No. 321.

Pendakur, K. 1998. "Changes in Family Income and Family Consumption Inequality between 1978 and 1992." *Review of Income and Wealth*. Vol. 44. No. 2. p. 259–283

Phipps S., and T. I. Garner. 1994. "Are Equivalence Scales the Same for the United States and Canada?" *Review of Income and Wealth*. Vol. 40. No. 1. p. 1–17.

Smeeding, T.M., and L. Rainwater. 2004. "Comparing living standards across nations: real incomes at the top, the bottom, and the middle." What Has Happened to the Quality of Life in the Advanced Industrialized Nations? E.N. Wolff (ed.). New York University and the Levy Economics Institute. Northampton, MA. Edward Elgar Publishing. p. 153–184.

Statistics Canada. 2001a. *The Assets and Debts of Canadians: An overview of the results of the Survey of Financial Security*. Statistics Canada catalogue no. 13-595-XIE. Ottawa, Ontario.

Statistics Canada. 2001b. *The Assets and Debts of Canadians: Focus on private pension savings*. Statistics Canada catalogue no. 13-596-XIE. Ottawa, Ontario.

Statistics Canada. 2006. *Life Tables, Canada, Provinces and Territories*. Statistics Canada catalogue no. 84-537-XIE.

Weisbrod B.A., and W.L. Hansen, 1968. "An income-net worth approach to measuring economic welfare." *American Economic Review*. Vol. 58. No.5. p. 1315–1329.

Wolff, E. N. and A. Zacharias. 2009. "Household Wealth and the Measurement of Economic Well-Being in the United States." *Journal of Economic Inequality*. Vol. 7. p. 83–115.

Wolfson, M.C. 1979. "Wealth and the distribution of income, Canada, 1969-1979." Review of Income and Wealth. Vol. 25. No. 2. p. 129–140.