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1 Household Data on Saving Behavior in Canada

John B. Burbidge and James B. Davies

1.1 Introduction

This paper uses Canadian microdata to examine age profiles of income, consumption, saving, and wealth holding. It looks not only at the most recent cross-sectional evidence, but, except for wealth holding where data limitations do not permit, constructs synthetic longitudinal data over the period 1978–90. This is a shorter time span than used for some of the other G7 countries in this volume, which are favored with longer-running consistent sample survey data.

In earlier work with Lonnie Magee and Les Robb, one of us has developed a set of statistical techniques for studying age profiles and has employed them on Canadian microdata sets to examine how earnings, consumption, and wealth holding vary over the life cycle.[1] This paper synthesizes and extends this research to consider saving. We begin by describing the data.

Statistics Canada releases public-use microdata tapes which record responses to questionnaires based on subsamples of the Labour Force Survey sampling frame. Family Expenditure Surveys ((FAMEX) are conducted in February and March and collect information on each household's income, expenditures, and changes in assets and liabilities during the previous calendar

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1. See Burbidge and Robb (1985), Burbidge, Magee, and Robb (1988), Robb and Burbidge (1989), Magee, Burbidge, and Robb (1991), Robb, Magee, and Burbidge (1992), Bar-Or et al. (1992), and Burbidge and Davies (1994).

year; FAMEX is publicly available for the 1978, 1982, 1984, 1986, and 1990 calendar years.[2] The Survey of Consumer Finances (SCF) is conducted in April and May every year. About every seven years, prior to 1984, the SCF measured family assets and debts as of the date of the survey and, as it always does, income for the previous calendar year. We have SCF assets and debts data for April/May 1977 and 1984. Public-use tapes for surveys of income exist for 1971–81 (biennial) and 1982–90 (annual).

The definition of saving used here is after-tax income minus current consumption. It is important to keep in mind that, as is common in such sample surveys, income excludes capital gains and capital income is not adjusted for inflation. In line with the practice throughout this volume, contributions to state-mandated and employer pension schemes are excluded from after-tax income. Current consumption includes expenditures on durables, which, of course, in truth embody a significant saving component. The upshot is that "saving" here means saving solely in financial form plus net payments made when purchasing housing, business equity, or producer durables.

What is known about the reliability of these data? First, response rates are quite high—78.4% in the 1984 SCF and 72.0% in the 1990 FAMEX.[3] But differential response and misreporting are always potential problems with survey data, so it is important to consider validation studies as well.

Statistics Canada has conducted validation studies that examine the coherence between expenditure estimates from FAMEX and the corresponding estimates from the National Income and Expenditure Accounts. Category by category, FAMEX numbers are quite close to those obtained in the National Income and Expenditure Accounts with the exception of expenditures on tobacco and alcoholic beverages, which are about half of the National Accounts estimates. If we adjust for conceptual differences between FAMEX and the National Accounts, total consumption expenditure in the 1986 FAMEX is about 8 percent lower than in the 1986 National Accounts (see Statistics Canada 1993). This is a concern for the present study, since we measure saving as the difference between after-tax income and consumption in the FAMEX surveys. An error of 8 percent in consumption could, in principle, translate into a much larger error in the saving residual.

In fact we believe that, within the limitations of the FAMEX saving definition, the saving numbers provided by this survey are reasonably reliable. First, it is not just consumption which is low relative to the National Accounts. The same is true for income, and the percentage shortfall is of similar magnitude.[4] Second, there is an internal check in the FAMEX questionnaire. Direct ques-

2. Microdata tapes may be purchased from Statistics Canada, Tunney's Pasture, Ottawa, Ontario, Canada. A sixth FAMEX tape for the 1969 calendar year will be publicly available shortly.

3. Response rates for earlier surveys were higher, ranging from 76.6% for the 1986 survey to over 80% for the 1978 and 1982 surveys.

4. Comparisons are regularly reported between SCF income aggregates and National Accounts data. These have been quite consistent over time. Wages and salaries, in aggregate, are quite accu-

tions are asked to establish the net change in assets minus liabilities for each household. If this is dissimilar to the gap between income and expenditure which one may deduce from answers to other questions, the discrepancy is brought to the interviewer's attention and the household is reinterviewed to see if "income − expenditure" can be reconciled with net change in assets and liabilities. Also, overall income minus consumption can be compared with the overall net change in assets minus liabilities. The sample means are within 10 percent of each other in all five surveys.

Studies have also been done on the relationship between SCF estimates of assets and debts and the National Balance Sheet (NBS) totals (Oja 1986; Davies, forthcoming). These comparisons are less illuminating than those for FAMEX because of the differences in scope and definition between the SCF and the NBS, and the fact that the NBS numbers themselves have many limitations. Overall, the SCF aggregates are much more reasonable for nonfinancial than for financial assets. Some financial assets are vastly underestimated; corporate shares, for example, are underrepresented by 80 percent.[5] Equally important for the purposes of this paper is the issue of whether one can assemble a picture of income, consumption, and saving from FAMEX data that is consistent with the income, assets, and debts picture from SCF data, at least for certain types of households. To the best of our knowledge this is an open question; this paper will begin to address this issue, but it cannot provide a complete answer.

While both FAMEX and SCF are multistage, stratified, clustered samples drawn from the Labour Force Survey sampling frame, Statistics Canada publications note some important differences which are relevant here:

(1) the unit surveyed differs;
(2) FAMEX reconstructs the household as it existed during the previous calendar year, while SCF describes the household as it existed at the time of the survey;
(3) there are differences in the population covered (see Statistics Canada 1992, 107).

With reference to the third point, prior to 1990, FAMEX focused on a "spending unit"—"a group of people living in the same dwelling who depend on a common or pooled income for major expenses or one financially indepen-

rately reported. Transfer income is underestimated by about 20%, and investment income by about 50%. The overall underestimation is about 8% in the SCF. Statistics Canada (1993) reports that FAMEX income estimates are about 97% of the SCF estimates.

5. The severe underestimation of corporate shares likely reflects the twin facts that (1) share ownership in Canada is highly concentrated, and (2) in part due to differential response by income and wealth level the SCF does not include any extremely wealthy families. On the latter point, the wealthiest family in the 1984 survey had a net worth of $6 million (1984 dollars). We work with quantiles below the affected region, and we use the SCF weights. If these weights accurately reflect the number of households in the extreme upper tail of the wealth distribution, the results reported below will also be accurate.

dent individual living alone." The unit surveyed in the 1990 FAMEX was "a person or group of persons occupying one dwelling unit." The SCF examines "economic families"—"a group of individuals sharing a common dwelling unit and related by blood, marriage or adoption." This difference in unit should be borne in mind when comparing FAMEX and SCF variables. A strict and accurate cumulation of FAMEX saving per unit up to age 45, say, would not produce observed SCF wealth per family at age 45, for example, even in the absence of measurement error. There are about 10 percent more family units than spending units, which tends to make per unit SCF numbers correspondingly lower.

Some important themes emerge from this paper. For example, it becomes clear that it is not safe to assess age patterns of consumption, saving, or wealth holding using isolated cross-sectional data. Second, apparent saving rates vary much more by income level than they do by age. Another finding is that Canadians save in essentially two phases. When young they do so by building up home equity. It is only in middle age that most make the transition to saving in the form of pension rights and financial assets. Finally, in common with several recent studies we find that continued saving after retirement is more the rule than the exception.

The remainder of the paper is organized as follows. Section 1.2 sets out the recent cross-sectional age profiles of household saving rates. Sections 1.3–1.5 explore how these cross-sectional profiles are determined by age profiles of income and consumption using FAMEX data. Section 1.6 then employs the 1977 and 1984 SCFs to examine how components of assets and debts vary with age. Section 1.7 presents a summary and conclusions.

1.2 Saving and Wealth: Recent Cross-Sectional Evidence

Tables 1.1–1.3 present a summary picture of household saving in Canada, as estimated by the 1990 FAMEX. Tables 1.4 and 1.5 provide comparable information on wealth holding from the 1984 SCF. The population of families and unattached individuals is grouped into five-year age groups, and within each age range into five after-tax income quintiles. For each variable we show overall medians by age group, and also medians for each quintile.[6]

Table 1.1 shows traditional saving rates: household saving divided by disposable money income. The overall median saving rate is .05. The age profile is humped, except for an interesting upturn for the 74+ age group (which is largely the result of an interesting jump for the top quintile). The saving rate peaks at ages 55–59. Note that the age pattern of these saving rates is quite different from what would be predicted by the life-cycle model (LCM), how-

6. The number of observations in each age-income cell is given for the two surveys in tables 1A.1 and 1A.2 in the appendix.

Table 1.1 **Median Saving Rates by (After-Tax) Income Quintile and Age Group**

Income Quintile	All	Age Group										
		<29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	>74
1	−0.05	−0.15	−0.06	−0.07	−0.04	−0.11	−0.03	−0.11	−0.02	−0.06	−0.05	0.02
2	−0.00	−0.04	−0.03	−0.01	0.02	0.07	0.05	0.04	0.06	−0.04	0.05	0.08
3	0.06	0.01	0.06	0.04	0.02	0.09	0.08	0.12	0.11	0.09	0.02	0.02
4	0.09	0.03	0.09	0.09	0.08	0.07	0.18	0.18	0.14	0.06	0.13	0.08
5	0.17	0.11	0.13	0.19	0.17	0.10	0.19	0.27	0.19	0.21	0.09	0.33
All	0.05	−0.00	0.03	0.03	0.05	0.05	0.08	0.11	0.09	0.06	0.06	0.08

Source: FAMEX for 1990 (all observations).

ever. While the median saving rate drops after ages 55–59, it remains at .06 or above.

Looking across quintiles, there is a monotonic increase of the saving rate with income up to, and including, ages 65–69. Thereafter there are some wobbles, but still a positive correlation. (The breakdown of the monotonic relationship after ages 65–69 may be due to declining sample size at these ages. See table 1A.1 in the appendix.) Median saving rates range from −.15 for bottom quintile households aged less than 29 to .33 for top quintile units aged 74+.

Table 1.2 looks at saving rates defined relative to total expenditure, rather than income. Under the permanent-income hypothesis (PIH) total expenditure serves as a proxy for permanent income. Compared with Table 1.1, the overall age profile is little affected, but differences in saving rates across income groups are increased.[7] The saving rates for bottom quintiles, whose total expenditure and income are very similar, are little affected, but saving rates for the top quintiles (whose expenditures falls short of income by a considerable margin) are increased. Actual median amounts saved are shown in Table 1.3, which shows that the variation in saving rates with age found in the first two tables can be traced very much to differences in amounts saved. To put these figures in perspective, it helps to keep in mind that median after-tax income overall was $44,610.

Tables 1.4 and 1.5 present some key information from the 1984 SCF wealth survey. Note that the influence of the nonsampling errors which especially affect surveys of assets and debts is considerably reduced here by the use of medians and other quantiles rather than means (which are so sensitive to extreme values). Even so, the numbers do need to be viewed with caution. In addition, it should be noted that SCF assets exclude equity in employer-based

7. Saving is not necessarily more stable relative to permanent income (PI) than relative to current income, even if this is true for consumption. In fact, it is precisely by having the saving rate jump around that smoothness in consumption can be maintained.

Table 1.2 **The Ratio of Median Saving to Total Expenditure by (After-Tax) Income Quintile and Age Group**

Income Quintile	All	Age Group										
		<29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	>74
1	−0.05	−0.13	−0.06	−0.07	−0.04	−0.10	−0.03	−0.10	−0.03	−0.05	−0.05	0.00
2	−0.00	−0.04	−0.03	−0.01	0.02	0.07	0.05	0.04	0.06	−0.04	0.05	0.08
3	0.06	0.01	0.07	0.04	0.02	0.10	0.08	0.14	0.12	0.10	0.02	0.02
4	0.10	0.03	0.10	0.10	0.08	0.07	0.22	0.22	0.16	0.07	0.15	0.09
5	0.21	0.12	0.15	0.23	0.21	0.11	0.23	0.37	0.23	0.27	0.09	0.49
All	0.05	−0.00	0.03	0.04	0.05	0.05	0.08	0.12	0.09	0.06	0.06	0.09

Source: FAMEX for 1990 (all observations).

private pension plans and life insurance, as well as durables other than homes and cars. All consumer debt, however, is included. These limitations in coverage lower estimated financial assets and net worth significantly.

Table 1.4 shows that net financial assets for Canadian households are very low up to about age 45, when the overall median is still just $2,845. At that point financial assets are built up very rapidly in the run-up to retirement, peaking at $20,046 at ages 60–64, and then declining in retirement. Table 1.5 also shows a hump shape, and a peak for ages 60–64, but the shape of the profile is very different. Net worth increases quite rapidly in the early years, when financial assets are creeping upward very slowly. The reason is that most of the accumulation taking place is in nonfinancial form, principally in housing equity. As we shall see later, the representative form of wealth accumulation for young Canadians is home purchase followed by fairly rapid paying off of mortgage debt.

Like the saving tables, tables 1.4 and 1.5 show sharp differences in wealth holding across income quintiles. It is instructive to note, however, that inequality in the holding of financial assets and net worth declines with age. The net worth of the top income quintile as a ratio to that of the bottom quintile declines from 65.7 at ages 30–34 to 8.0 at ages 60–64, for example.[8]

Finally, although all the data shown in these tables are from cross sections, they already point out pitfalls of relying too much on isolated pieces of cross-sectional evidence. Looking at the wealth-holding tables alone one would think that the Canadian data provide strong confirmation of the LCM: median wealth holding declines by 46 percent from ages 60–64 to 74+. But the saving tables suggest that this picture may be highly misleading. Apparent saving rates remain positive and large throughout all the retirement years that we can observe

8. The top/bottom quintile net worth ratio rises after ages 60–64, ending up at 27.6 for those aged 74+. This rise is not found, however, if households are ranked according to wealth rather than income. Unlike the United States, standard measures of inequality indicate that wealth inequality continues to rise in retirement in Canada. See, e.g., Davies (1979) or Siddiq and Beach (1993).

Table 1.3 **Median Saving by (After-Tax) Income Quintile and Age Group (1990 Canadian $)**

		Age Group										
	All	<29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	>74
1	−622	−1,653	−796	−1,089	−758	−1,164	−567	−1,103	−468	−799	−443	111
2	−24	−799	−844	−394	606	2,109	1,534	973	1,448	−598	605	854
3	1,800	342	2,003	1,448	825	3,977	3,295	4,461	3,435	2,289	367	305
4	4,125	1,056	4,009	4,379	4,270	3,636	10,358	9,705	4,275	2,585	3,254	1,749
5	11,611	5,459	7,132	12,712	14,095	9,354	15,444	20,054	10,535	11,083	4,167	12,462
All	1,228	−189	829	1,008	1,708	1,886	3,140	3,020	2,070	1,295	856	1,257

Source: FAMEX for 1990 (all observations).

Table 1.4 **Median Net Financial Assets by (After-Tax) Income Quintile and Age Group (1990 Canadian $)**

Income Quintile	All	Age Group											
		<25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	>74
1	300	1	8	26	3	32	304	259	647	1,565	1,659	1,681	2,612
2	1,940	6	22	1,035	647	1,373	2,889	5,220	5,314	13,104	8,154	6,848	5,186
3	2,716	−39	−59	1,132	1,849	3,765	5,348	10,424	15,720	19,399	17,947	11,407	12,092
4	5,381	0	0	2,085	4,475	6,034	11,180	15,720	26,900	27,413	32,853	27,071	25,135
5	19,923	252	3,207	10,088	11,624	15,138	27,146	39,264	37,001	66,126	66,504	74,818	65,161
All	3,350	3	26	1,044	1,526	2,845	6,080	9,577	12,867	20,046	17,938	12,998	10,772

Source: SCF for 1984 (all observations).

Table 1.5 **Median Net Worth by (After-Tax) Income Quintile and Age Group (1990 Canadian $)**

Income Quintile	All	Age Group											
		<25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	>74
1	2,438	12	136	1,377	3,829	5,348	11,041	2,615	25,736	32,850	14,226	5,561	5,734
2	26,404	243	2,781	16,211	33,419	40,472	64,787	66,394	66,204	81,775	53,246	28,996	35,177
3	42,627	936	10,890	32,319	55,829	60,125	107,990	98,395	112,536	104,943	85,124	78,628	47,612
4	70,549	5,458	19,077	43,649	68,174	91,556	122,958	135,278	146,097	131,269	124,492	127,163	86,105
5	139,494	14,453	44,948	90,433	119,720	142,909	197,880	194,045	200,990	263,967	178,567	171,917	158,001
All	50,980	1,429	10,090	33,902	55,459	67,439	95,162	99,855	106,627	109,380	84,485	74,212	59,582

Source: SCF for 1984 (all observations).

in the FAMEX data. The apparent hump shape of the age-wealth profile may therefore very well simply be a cross-sectional artifact. If Canadian cohorts were observed longitudinally, no evidence of a decline of wealth in retirement might be found.

It is also instructive to think about the implications of the positive relationship between saving rates and current income found in the saving tables. With zero mobility in the income distribution, this pattern would suggest wealth inequality rising with age. In fact we find declining wealth inequality in the SCF data, as noted above. In addition to appealing to possible data problems, one way to reconcile these observations is to note that there is considerable income mobility over the life cycle. Thus, the representative spending unit in the bottom quintile has not spent its entire existence in that quintile, and its accumulated wealth is much larger than one would expect if it had been in the same quintile all along.

1.3 Data and Methods

The 1978, 1982, and 1986 FAMEX cover both urban and rural areas, but those for 1984 and 1990 cover only major urban centers with populations in excess of 100,000. To achieve comparability with all five surveys we restrict our attention to major urban centers. All spending units, that is, nonfamily households, families, and unattached individuals, are included in the following analysis. We exclude units whose heads were less than 25 or more than 75 years of age, however.[9]

Family expenditure surveys in most countries use a diary method, whereby the household records every expenditure over, say, a two-week period. The Canadian FAMEX is different; households are asked to recall their financial transactions during the previous calendar year using whatever records they happen to have at hand.[10] The surveyor tries to obtain a complete list of expenditures, total income before taxes, and net change in assets and liabilities. A basic test of data accuracy is that income minus expenditure minus net change in assets and liabilities (call this difference "TEST") be zero. Statistics for these and other variables are shown in table 1.6 for the 1990 FAMEX. The mean of TEST is small relative to pretax income or total consumption.

After the head's age, we list pretax income and its major components—earnings, capital income, government transfer income (which includes unemployment insurance receipts, welfare receipts, Canada and Quebec Pension Plan [C/QPP] benefits, Old Age Security [OAS] and Guaranteed Income Sup-

9. There are very few spending units with heads aged less than 25 years, so we have begun our age profiles at age 25 for the sake of reliability. At the other end of the age scale, all units with heads aged 76 or more were coded "76" in the survey. In the absence of some correction, including these units would distort the age profiles toward the end of the life cycle.

10. The surveyor interviews one or more members of the household in the household over a three to four hour period. Second visits are made occasionally.

Table 1.6 **Selected Statistics for Extracts Drawn from FAMEX Data Sets (1990 Canadian $)**

Variable	Mean	Standard Deviation	Minimum	Maximum
	1978 Data Set (N = 4,671)			
Age	45.6	13.8	25.0	75.0
Pretax income	49,086.9	28,231.5	320.7	238,014.5
Earnings	0.0	0.0	0.0	0.0
Capital income	0.0	0.0	0.0	0.0
Government transfer income	0.0	0.0	0.0	0.0
Other income	0.0	0.0	0.0	0.0
After-tax income	39,090.4	20,870.3	320.7	210,937.8
C/QPP contributions	424.5	288.9	0.0	2,802.6
Other pension contributions	756.7	1,565.1	0.0	20,949.9
Total consumption	35,190.7	17,274.1	2,501.2	148,586.2
Nondurbles	27,683.5	12,473.1	2,393.2	137,472.0
Durables	7,507.2	7,571.0	0.0	77,795.8
Health expenditures	548.4	781.6	0.0	20,501.0
Saving	3,899.7	12,419.2	−74,761.3	153,776.6
Change in RRSPs	713.7	2,235.9	−14,964.2	29,928.4
Home value	78,210.5	77,876.8	0.0	641,323.8
Number of adults	2.1	0.9	1.0	8.0
Number of children under 18	0.9	1.2	0.0	9.0
Total expenditure	45,666.5	24,462.5	3,223.7	172,383.6
Net change in assets/liabilities	3,334.7	11,822.0	−61,793.7	153,526.5
Test	85.8	3,854.0	−23,587.9	19,152.1
	1982 Data Set (N = 6,100)			
Age	45.6	14.2	25.0	75.0
Pretax income	47,020.1	29,447.5	1,285.0	276,551.8
Earnings	37,836.4	29,121.7	0.0	229,434.3
Capital income	2,904.7	7,882.8	0.0	147,768.8
Government transfer income	3,939.9	5,008.9	0.0	42,831.5
Other income	1,412.7	5,001.9	0.0	103,758.0
After-tax income	36,838.2	21,589.2	−33,368.6	266,300.8
C/QPP contributions	417.8	296.8	0.0	2,370.0
Other pension contributions	750.1	1,426.2	0.0	15,967.6
Total consumption	32,613.3	17,300.7	3,171.0	220,094.2
Nondurables	25,696.9	12,562.0	3,171.0	172,415.5
Durables	6,916.5	7,567.7	−20,463.5	118,210.8
Health expenditures	831.9	988.2	0.0	29,900.7
Saving	4,224.9	12,915.2	−107,891.2	208,909.4
Change in RRSPs	598.1	3,268.4	−127,066.9	51,397.8
Home value	69,109.7	78,819.0	0.0	1,427,716.6
Number of Adults	2.0	0.8	1.0	8.0
Number of children under 18	0.8	1.1	0.0	7.0
Total expenditure	42,795.1	24,905.0	3,171.0	279,365.9
Net change in assets/liabilities	3,991.9	12,662.3	−105,773.9	208,027.1
Test	233.1	5,263.9	−61,517.5	120,419.4

(*continued*)

Table 1.6 (continued)

Variable	Mean	Standard Deviation	Minimum	Maximum
	1984 Data Set (N = 4,232)			
Age	45.5	14.1	25.0	75.0
Pretax income	46,978.1	30,736.1	0.0	240,552.0
Earnings	37,676.6	30,905.7	−142.3	222,963.2
Capital income	2,579.9	9,044.0	−64,664.5	215,176.3
Government transfer income	4,132.2	5,248.3	0.0	49,817.5
Other income	1,567.4	5,318.8	0.0	90,530.3
After-tax income	36,457.4	22,040.9	0.0	240,552.0
C/QPP contributions	446.7	334.5	0.0	2,247.7
Other pension contributions	734.2	1,420.1	0.0	11,827.1
Total consumption	33,284.6	17,773.6	1,579.1	156,618.7
Nondurables	25,834.9	12,783.0	2,452.1	143,877.2
Durables	7,449.7	7,767.5	−18,325.9	68,713.8
Health expenditures	817.5	840.0	0.0	9,964.8
Saving	3,172.8	13,314.7	−60,339.7	187,894.3
Change in RRSPs	761.9	2,751.9	−42,678.6	49,145.0
Home value	65,706.8	73,262.4	0.0	646,645.0
Number of adults	2.0	0.9	1.0	7.0
Number of children under 18	0.8	1.0	0.0	6.0
Total expenditure	43,805.3	26,311.5	1,777.0	219,329.1
Net change in assets/liabilities	3,025.7	12,689.8	−63,604.0	192,312.2
Test	147.1	3,779.2	−20,245.2	21,704.0
	1986 Data Set (N = 5,851)			
Age	45.4	13.9	25.0	75.0
Pretax income	49,647.0	37,266.8	−3,907.7	1,553,461.8
Earnings	39,976.0	33,947.1	−11,950.0	1,552,783.0
Capital income	2,402.9	13,073.3	−14,340.0	659,042.5
Government transfer income	4,073.6	5,369.7	0.0	74,217.9
Other income	2,097.2	10,373.8	0.0	394,583.0
After-tax income	37,837.1	26,662.0	−25,446.3	947,202.4
C/QPP contributions	507.4	377.9	0.0	2,048.2
Other pension contributions	613.1	1,293.5	0.0	14,777.4
Total consumption	35,932.3	20,570.1	−15,354.5	352,213.1
Nondurables	27,400.2	14,505.4	2,608.7	254,940.1
Durables	8,532.2	9,521.8	−61,438.5	102,398.4
Health Expenditures	827.1	980.9	0.0	20,452.4
Saving	1,904.8	17,146.3	−103,898.1	594,989.3
Change in RRSPs	932.9	4,062.7	−108,169.0	110,637.9
Home value	81,877.8	98,391.8	0.0	1,193,805.0
Number of adults	2.0	0.9	1.0	8.0
Number of children under 18	0.8	1.1	0.0	8.0
Total expenditure	47,742.2	30,858.0	2,762.8	958,472.4
Net change in assets/liabilities	2,107.7	16,971.7	−119,393.6	651,275.0
Test	−202.9	4,273.5	−56,285.7	46,818.9
	1990 Data Set (N = 4,089)			
Age	45.3	13.8	25.0	75.0
Pretax income	52,892.4	38,787.2	695.0	948,000.0
Earnings	42,638.1	34,840.4	−7,468.0	339,500.0

Table 1.6 (continued)

Variable	Mean	Standard Deviation	Minimum	Maximum
	1990 Data Set (N = 4,089)			
Capital income	2,188.8	7,273.1	−22,500.0	112,402.0
Government transfer income	4,125.0	5,738.2	0.0	42,448.0
Other income	2,273.7	7,093.4	0.0	99,000.0
After-tax income	39,385.0	29,742.2	−16,695.0	929,000.0
C/QPP contributions	587.9	417.0	0.0	3,055.0
Other pension contributions	738.9	1,513.6	0.0	17,500.0
Total consumption	36,082.2	20,602.6	1,549.0	266,711.0
Nondurables	27,180.8	14,901.7	3,607.0	257,242.0
Durables	8,901.4	9,536.6	−17,385.0	87,018.0
Health expenditures	688.2	1,025.8	0.0	15,500.0
Saving	3,302.8	22,737.2	−204,188.0	786,720.0
Change in RRSPs	1,076.1	3,984.0	−50,000.0	68,000.0
Home value	97,610.1	113,400.4	0.0	999,999.0
Number of adults	1.9	0.8	0.0	7.0
Number of children under 18	0.7	1.0	0.0	6.0
Total expenditure	49,589.6	30,358.9	3,607.0	311,200.0
Net change in assets/liabilities	3,326.4	22,807.8	−220,000.0	821,000.0
Test	−23.6	5,041.6	−66,642.0	45,247.0

plement [GIS] payments), and other income (which are primarily payments from private pension plans).[11] Note that the components are unavailable for the 1978 FAMEX and that all relevant variables are measured in 1990 dollars. The definitions change somewhat across the surveys; for example, earnings excluded self-employment income in the 1982 and 1984 surveys, but then included this item after 1984. One consequence is that "earnings" could be negative in the 1986 and 1990 surveys.

Our measure of after-tax income is pretax income from all sources (excluding capital gains, which FAMEX does not measure) less mandatory deductions for income and payroll taxes, and government and employer-sponsored pension plans. Since saving is after-tax income less consumption this means that our measure of saving excludes contributions to employer-sponsored pension plans but does include tax-sheltered savings instruments like Registered Retirement Savings Plans (RRSPs). This definition of saving is somewhat more consistent with our assets and debts data, which provide no estimate of assets in employer-sponsored pension plans but which do include an estimate of RRSP wealth.[12]

11. Note that, contrary to what might be expected, mean age of head declines slightly over the five FAMEX surveys, from 45.6 in 1978 to 45.3 in 1990. This trend is opposite to the aging trend of the Canadian population as a whole. It must reflect compositional changes among spending units, for example a tendency for the number of units with younger heads to increase as the rate of divorce and marital separation increases over time and the population of single-headed families increases.

12. Similarly, life insurance contributions are excluded from after-tax income (and thus saving), and our SCF assets data provide no estimate of the value of assets held in life insurance policies.

Table 1.6 indicates that over the five FAMEX surveys from 1978 to 1990 both pretax and after-tax income exhibit a U-shaped time series. Pretax income fell from about $49,000 in 1978 to around $47,000 in each of 1982 and 1984. It then moved slightly higher than the 1978 level in 1986, reaching $49,647; in 1990 it peaked at $52,892. Due to increasing tax rates, after-tax income in 1990 was, in contrast, only slightly above its 1978 level, standing at $39,385 versus a 1978 figure of $39,090. Neglecting 1978, where information on income components is unavailable, earnings follows a time path qualitatively similar to that of pretax income. In contrast, capital income was at its peak, $2,905, in 1982, and declined in each subsequent year. As discussed below, saving was also at its peak in 1982, and declined in 1984 and 1986. This crude association raises the question of whether there are differential saving rates out of earnings versus capital income. Addressing this question is unfortunately beyond the scope of this paper.

Table 1.6 indicates that total consumption (which includes expenditures on durables but not down payments on housing or payments of principal on mortgages) declined sharply between 1978 and 1982, and surged upward from 1984 to 1986. Given the, somewhat larger, decline in after-tax income from 1978 to 1982, saving rose in this time period. Consumption moved up faster than income, however, from 1982 to 1986, producing a halving of personal saving between these years. The decline was far from permanent, however, with a jump from $1,905 to $3,303 occurring between 1986 and 1990. Thus, aggregate personal saving is quite volatile in the FAMEX data. This volatility is the result of variations over time in after-tax income and in consumption, and of the fact that changes in these variables over time are typically far from being equal in size.

Health expenditure in table 1.6 includes direct expenditures on items like drugs, dental care, and health care services, as well as public and private health insurance premiums. Over the entire period 1978–90 the compulsory and universal public health insurance scheme, known as Medicare, was in force. This scheme covers most physician services. In our survey years of 1978–86, three of Canada's ten provinces, with about half the country's population, levied health insurance premiums, which ranged up to $30 per month for a single individual and $60 per month for a family. In the 1990 survey year, the most populous province (Ontario) had discontinued its health insurance premiums, so that only a small minority of Canadian families paid such premiums.

One can deduce from table 1.6 that health expenditures are under 3 percent of total expenditure but they did rise significantly in 1990 despite the discontinuation of health insurance premiums in Ontario. And health expenditures are not small relative to personal saving, ranging from 25 percent to 45 percent. Thus, the numbers in table 1.6 are not inconsistent with precautionary saving motivated by the threat of future health expenditures. It remains to be seen at what ages, if any, this saving motive might be especially important. This issue is examined in the next section.

The market value of the household's dwelling, "Home value," is one variable that is common to both FAMEX and SCF data sets, but there are some important differences. FAMEX asks the household to estimate the value as of December 31st (a month or two before the survey is conducted). SCF asks the household to estimate market value at the time of the survey but then, if some part of the dwelling is used for business purposes (e.g., renting a room to a boarder), only the value of that part of the house used for nonbusiness purposes is recorded as "Home value" and the rest is included in another category. Thus the SCF numbers tend to be lower than those for FAMEX. Given the presence of zeros and outliers in this variable, the mean of this variable probably conveys very little information. FAMEX also monitors the net change in holdings of RRSPs, which are an important form of tax-sheltered savings; once again, means and standard deviations are not very informative, but as we shall see the distribution of this variable conditional on age is.

Table 1.6 also indicates that the representative spending unit is quite small. Rounding off the means, the typical spending unit has two adults and one child. Of course, there is considerable variation in these numbers, especially in the number of children.

Table 1.7 provides selected summary data for the 1977 and 1984 SCF wealth surveys. It indicates mean net worth per family of $103,857 in 1984, in 1990 dollars. For the reasons discussed in the introduction it is clear that this is an underestimate, reflecting in large part the absence of the extreme upper tail of the wealth distribution from the SCF samples. This error in means provides further justification for our concentration on medians and quantiles elsewhere in the paper. The surveys also suggest that nonfinancial assets almost eclipse financial assets in aggregate. The NBS figures make clear that this is misleading in terms of the aggregate picture. However, it is not necessarily misleading for the bottom 95 percent of the population, for which these surveys may be "reasonably" accurate. Note finally that the figures for home value, which U.S. validation studies indicate is quite reliably estimated on average in sample surveys, are about 10 percent lower than the FAMEX estimates shown in table 1.6, for the reasons discussed earlier.

The minimum and maximum columns of table 1.6 and table 1.7 show that some variables assume extremely high or low values. Predicted values obtained from standard regression techniques of, say, net worth on age are known to be sensitive to the presence of outliers and to functional form. This is why we have chosen to estimate age profiles with "kernel-smoothed quantiles," which are relatively insensitive to the presence of outliers in the data and place weaker restrictions on the shape of the age profiles. A "quantile" is a generalization of the concept of a median. For example, the .8 quantile of family income at age 40 is the income level such that 80 percent of those aged 40 have lower incomes; the median is the .5 quantile. We obtain a "kernel-smoothed quantile," say at age 40, as follows. Let $F(\text{age} - 40)$ be the "kernel" function which determines the weight to place on incomes at ages in a neighborhood of

Table 1.7 **Selected Statistics for Extracts Drawn from the Assets and Debts SCFs (1990 Canadian $)**

Variable	Mean	Standard Deviation	Minimum	Maximum
		1977 Data Set (N = 5,037)		
Age	45.1	14.4	25.0	75.0
Net worth	104,664.4	176,665.3	−515,795.1	16,337,206.0
Total assets	127,751.4	183,491.3	0.0	16,479,558.0
Total debt	23,087.1	35,888.7	0.0	931,773.9
Net financial assets	19,238.5	57,887.7	−852,291.3	1,411,835.4
Home equity	55,351.9	69,363.5	−487,084.8	815,302.1
Home value	73,856.7	79,842.9	0.0	815,302.1
Home-owner dummy	0.6	0.5	0.0	1.0
		1984 Data Set (N = 6,819)		
Age	45.5	14.1	25.0	75.0
Net worth	103,857.6	157,271.6	−179,250.0	1,764,500.3
Total assets	122,087.3	163,137.9	0.0	1,783,678.5
Total debt	18,229.8	31,684.3	0.0	461,991.7
Net financial assets	25,097.2	65,540.4	−321,650.3	1,284,330.1
Home equity	48,179.7	68,417.3	−43,971.9	1,166,677.0
Home value	61,749.9	76,268.1	0.0	1,216,856.6
Home-owner dummy	0.6	0.5	0.0	1.0

40. We assume F is a parabola with a peak at age 40.[13] The "bandwidth" is the distance between the two age values where the parabola cuts the age axis. The "weight" on age levels outside this range is zero, and relative weights on age levels within this range are determined by the height of the parabola and are then scaled so that they sum to unity.[14] The .8 kernel-smoothed quantile at age 40 is then the weighted average of the .8 quantiles of the income distributions at and around age 40. Since age is recorded as an integer in our data, bandwidths of 2 or smaller imply the "raw" or unsmoothed quantile is being used. An infinite bandwidth places equal weights on all ages.

Since the shape of the kernel-smoothed quantiles of some dependent variable conditional on age depends on the bandwidth chosen, it is useful to specify some criterion for choice of bandwidth. We employ the "L1 loss function with cross-validation."[15] The median income at age 40, M40, minimizes the

13. Our earlier work suggests that results are insensitive to the kernel function assumed so long as one uses "cross-validated bandwidths" (see below).

14. This is slightly oversimplified. As noted above the Labour Force Survey is not a random sample. On each public-use microdata tape Statistics Canada releases its estimate of the inverse of the probability that the household is included in the sample ("universal weights"). The kernel-smoothed estimates reported below use these weights in conjunction with the kernel weights.

15. The following is an "intuitive" explanation; technical details are in Magee, Burbidge, and Robb (1991), which also discusses limitations of the approach, such as edge effects.

sum of absolute deviations of all incomes at age 40 from M40; the .8 quantile, .8Q40, minimizes a weighted sum of absolute deviations of incomes above and below .8Q40 (.8 on incomes above, .2 on incomes below). A sensible loss function in this context (the L1 loss function) is a weighted sum of absolute prediction errors from "out of sample" (or "leave one out") prediction. For each bandwidth one can calculate the value for the L1 loss function, and the "cross-validated" (CV) bandwidth is the one that minimizes this loss function.

CV bandwidths tend to vary with the size of the data set (larger data sets have lower CV bandwidths) and the quantile being estimated (quantiles away from the median where the data are thinner tend to have larger CV bandwidths). Nevertheless, in our experience, pictures drawn with different bandwidths for different quantiles in the same diagram focus attention on unimportant details, and we shall use a single "typical" bandwidth for each variable in this paper.

We have used the kernel-smoothing technique to isolate year and cohort effects, and to remove them from the estimated "pure" age profiles, which are shown below. In doing so, we have first removed the year effects, on the argument that inspection of the raw year-to-year changes for particular age groups suggests that year effects are likely quite important. This involves iterating to find the assignment of year effects which will minimize the L1 loss function. Cohort effects are then removed, conditional on the initial identification of year effects.[16]

For each variable in the FAMEX data, we present a two-part figure. The first part (*A*) shows the pure age effect—a kernel-smoothed median with cohort and year effects removed (denoted by a solid line). It also traces the raw medians for six different cohorts across the 1978, 1982, 1984, 1986, and 1990 surveys. The cohorts consist of spending units with heads whose ages in 1978 were less than 25, 25–34, 35–44, 45–54, 55–63, and 64+.[17] The second part of the figure (*B*) graphs the estimated pure age effects (most often) for the .25, .5, and .75 quantiles.

1.4 Age Profiles

We now turn to a step-by-step examination of the age profiles of income, consumption, saving, and wealth in Canada. Except for wealth, all the data come from the FAMEX surveys. In the case of wealth, the data sources are the 1977 and 1984 SCFs.

16. The order in which cohort and year effects are removed is arbitrary. We have experimented with removing them in the opposite order. Results are little affected.

17. There are no observations on the first group (aged less than 25) in 1978. The cutoff for the last group (64+) was set at age 64 so that this group is just eliminated in the 1990 survey year. At that point, the group who were aged 55–63 in 1978 are 67–75, i.e., just covering the top available ages. (Recall that observations on those coded with age "76" are not used here.)

1.4.1 Income

Pretax Income

This variable includes all forms of income measured by FAMEX, but there are no imputations, e.g., for imputed rent on owner-occupied housing. Figure 1.1 shows quantiles peaking later for higher income groups, but with the overall median peaking between ages 45 and 50; the quantiles tend to fan out from age 25 to age 50 and then compact somewhat from age 50 to age 75. The .25 quantile appears to be forced closer to the median late in the life cycle, probably as a consequence of public pension programs. From a preretirement peak of over $55,000, median pretax income declines to a postretirement level of about $18,000. Note from Figure 1.1*A* that 1982 and 1984 were low-income years, as we observed in our discussion of table 1.6; this pattern is reflected in many of the subsequent figures.

Earnings

Figure 1.2 indicates, not surprisingly, that age profiles for earned income are similar to those for total income.[18] There is, however, a more pronounced hump and a clear retirement effect. In addition, there is no noticeable convergence of the .25, .5, and .75 quantiles in the higher age ranges.

Capital Income

Figure 1.3*A* shows that median capital income rises with age up to about age 70, peaking at about $1,500. The increase is slow, however, prior to about age 50. The raw medians show strong year effects, but, in contrast to the income pictures, 1982 is here the best year. Year effects decline and become negative over 1984–90. In interpreting these year effects it is important to keep in mind that inflation rates were also declining over this period, so that part of the fall in capital income is due simply to the drop in its purely inflationary component. Ideally, it can be argued, capital income should be measured gross of capital gains (here omitted) and net of the inflationary component. Dagenais (1992) implements this approach for Canada over the period 1962–85. The result is that measured capital income becomes highly volatile. The same also becomes true of measured saving, as will be noted later.

Figure 1.3*B* shows that one-quarter of all households have negligible capital income in retirement, and even the median household has under $1,200. The quantiles do fan out, however, and the top quarter of spending units receive over $5,500 of capital income in retirement.

Government Transfer Income

Figure 1.4 reveals a huge change at retirement as median government transfers switch from about $1,000 to about $10,000. Figure 1.4*A* shows that gov-

18. Note that, in contrast to figure 1.1*A*, we have only four observations for each cohort. This is because, as mentioned earlier, the 1978 FAMEX does not break income into its components.

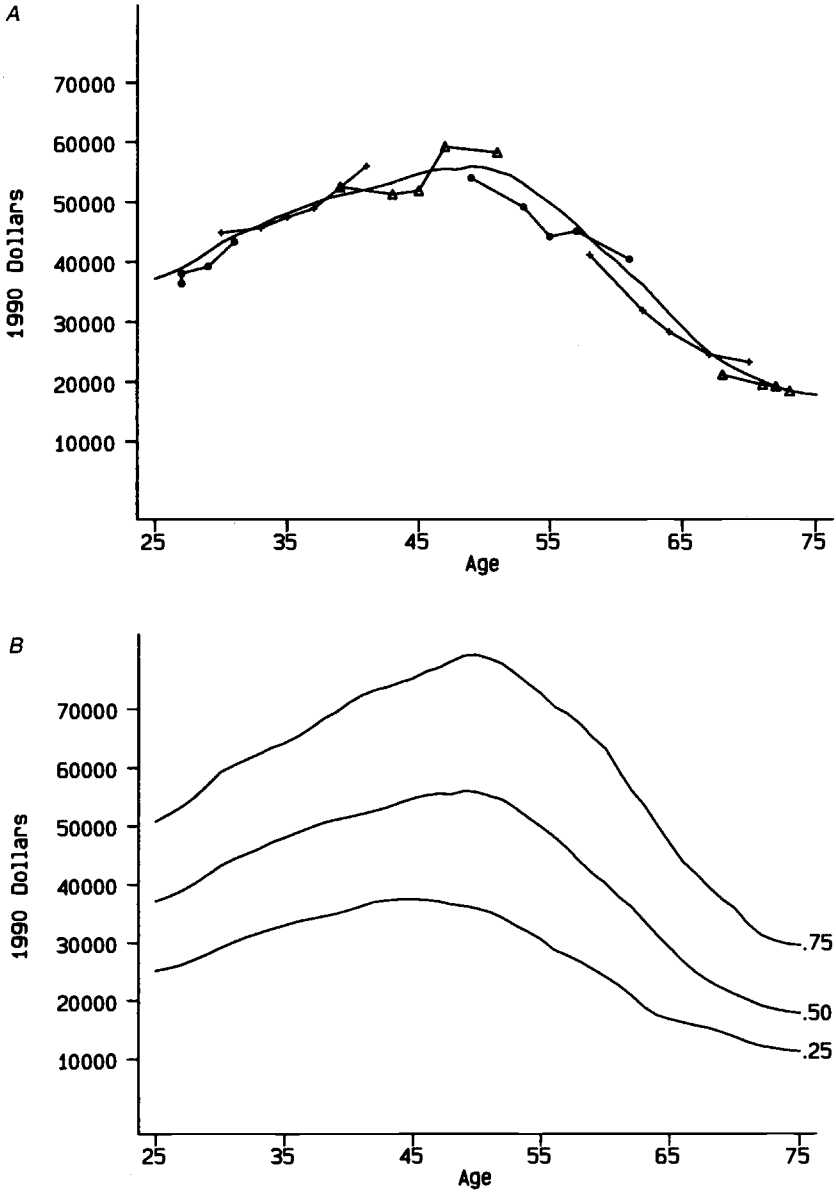


Fig. 1.1 Quantiles for pretax income

Note: The bandwidth is 8. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

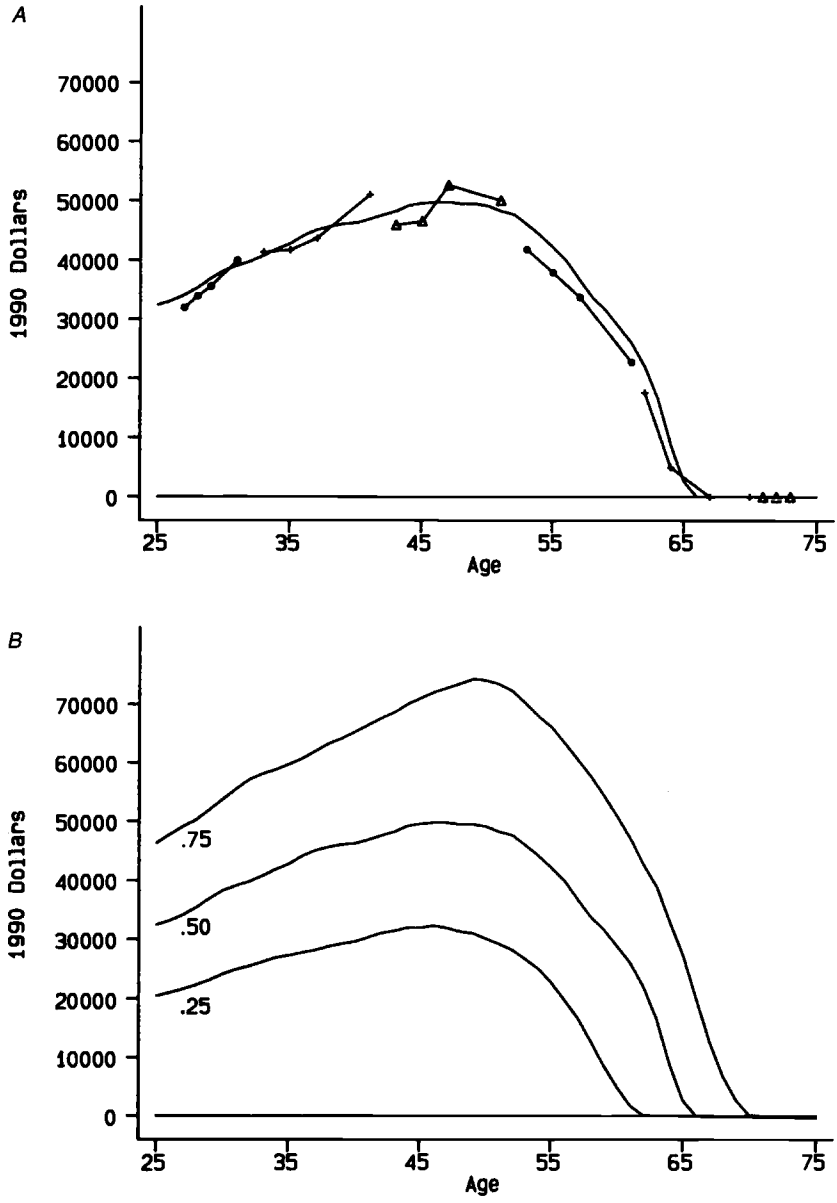


Fig. 1.2 Quantiles for earnings

Note: The bandwidth is 8. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

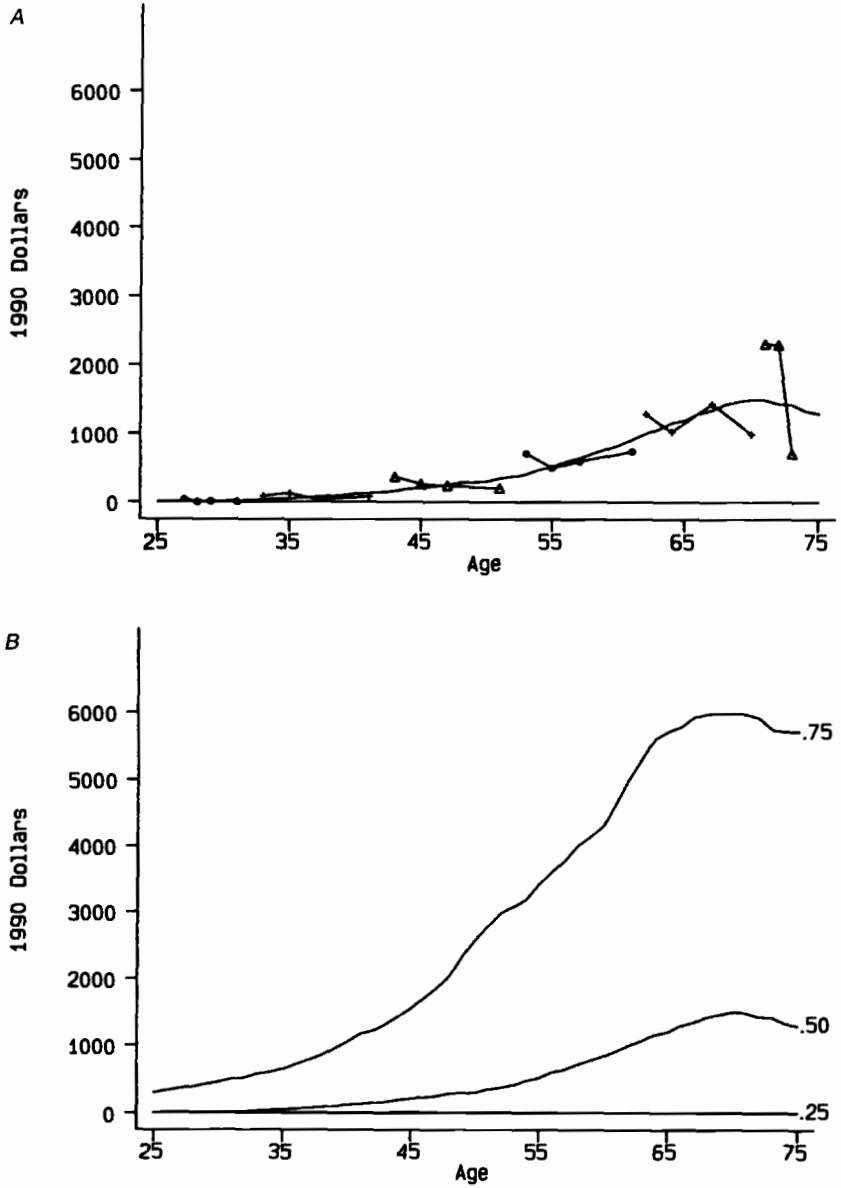


Fig. 1.3 Quantiles for capital income

Note: The bandwidth is 12. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

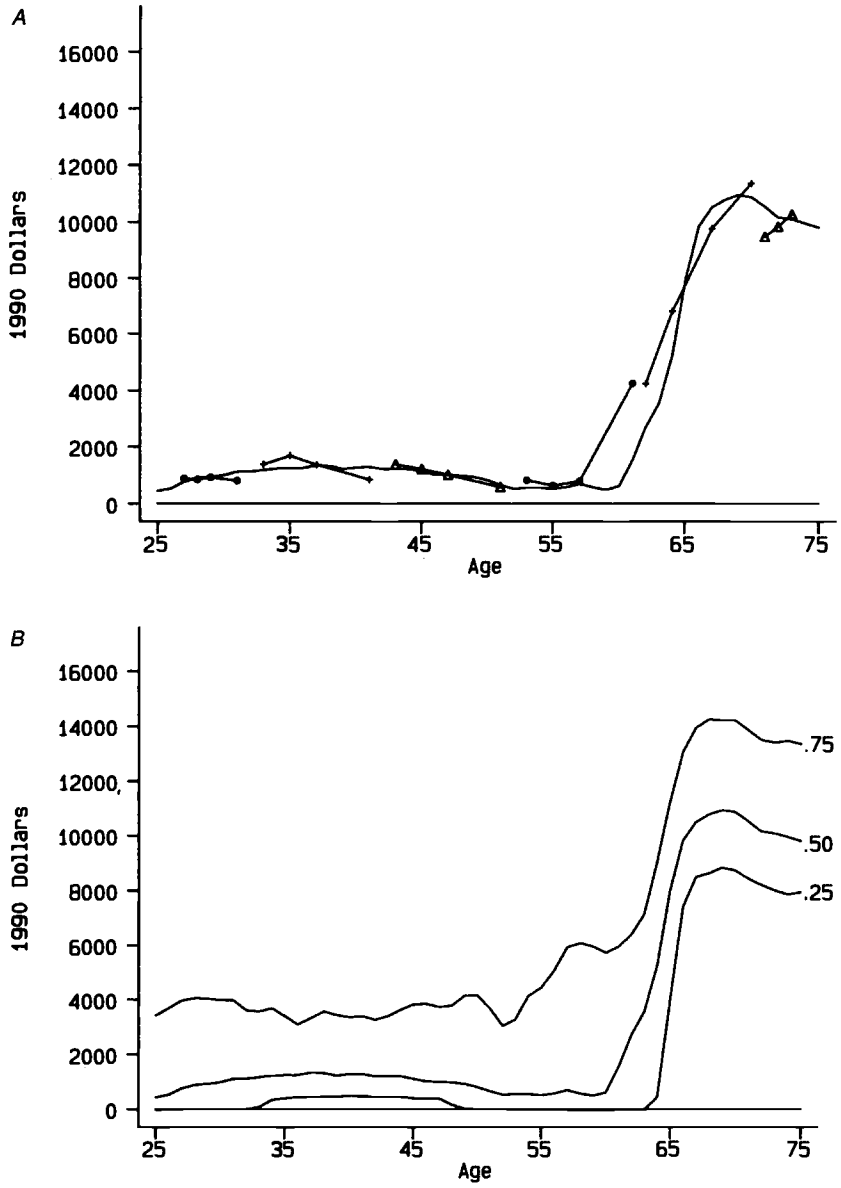


Fig. 1.4 Quantiles for government transfer income

Note: The bandwidth is 3. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

ernment transfers prior to retirement have fallen over this period while median transfers postretirement have risen sharply. Year effects are therefore highly nonlinear here. Figure 1.4*B* shows that even the .25 quantile receives about $8,000 in government transfers in retirement. The decline during retirement is related to an increasing incidence of unattached individuals. Much of the spread in transfers between the quantiles in retirement is likely due to differences in size of spending units (i.e., in number of pensioners).

Other Income

This source of income is primarily income from private pension plan receipts. Like the previous category, figure 1.5*A* indicates an upward trend in retirement income. About one-half of all retirees are covered by a private pension plan but median payments are small relative to their receipts from public sources (see above). Over 90 percent of members of private pension plans are in defined-benefit pension plans.

After-Tax Income

This and pretax income are the comprehensive measures of income available in FAMEX data sets. Comparing figure 1.6*A* with 1.1*A* we see that after-tax income is flatter than pretax income; the hump shape is muted. Also, 1990 is still a relatively good year, but does not stand out as much as for pretax income. This reflects the fact that average tax rates rose significantly in the late 1980s (see Burbidge and Davies 1994). Figure 1.6*B* shows that quantiles for after-tax income, like those for pretax income, fan out until income of the higher quantiles peaks around age 50. Thereafter, the .5 and .75 quantiles are roughly parallel, but the .25 quantile comes closer to the median.

It is useful at this point to summarize some of the numbers underlying these figures by calculating replacement rates. The figures show that ages 45–54 are peak years for income, ages 55–65 are years when almost all individuals exit the labor force, and ages 66–75 are spent in retirement. Table 1.8 calculates replacement rates as the ratio of quantile income in retirement to quantile income in peak-income years. Using either pretax or after-tax income, except for 1986, replacement rates have been trending upward over the data period, and as one would expect they are higher for after-tax than for pretax income. Government transfers replace just under one-quarter of peak earnings. The replacement rate built into the C/QPP is 25 percent on earnings up to the average industrial wage, which was about $30,000 in 1990. OAS (payable at age 65 and taxable) and the GIS (age and income conditioned) provide a safety net for low-income elderly. This is one reason why the numbers in the Government Transfer Income/Earnings column fall sharply as one moves from lower to higher quantiles. The opposite occurs for pretax and after-tax income. Here median "other income," for those with private pensions, is over $10,000 per annum and replacement rates rise with the quantiles.

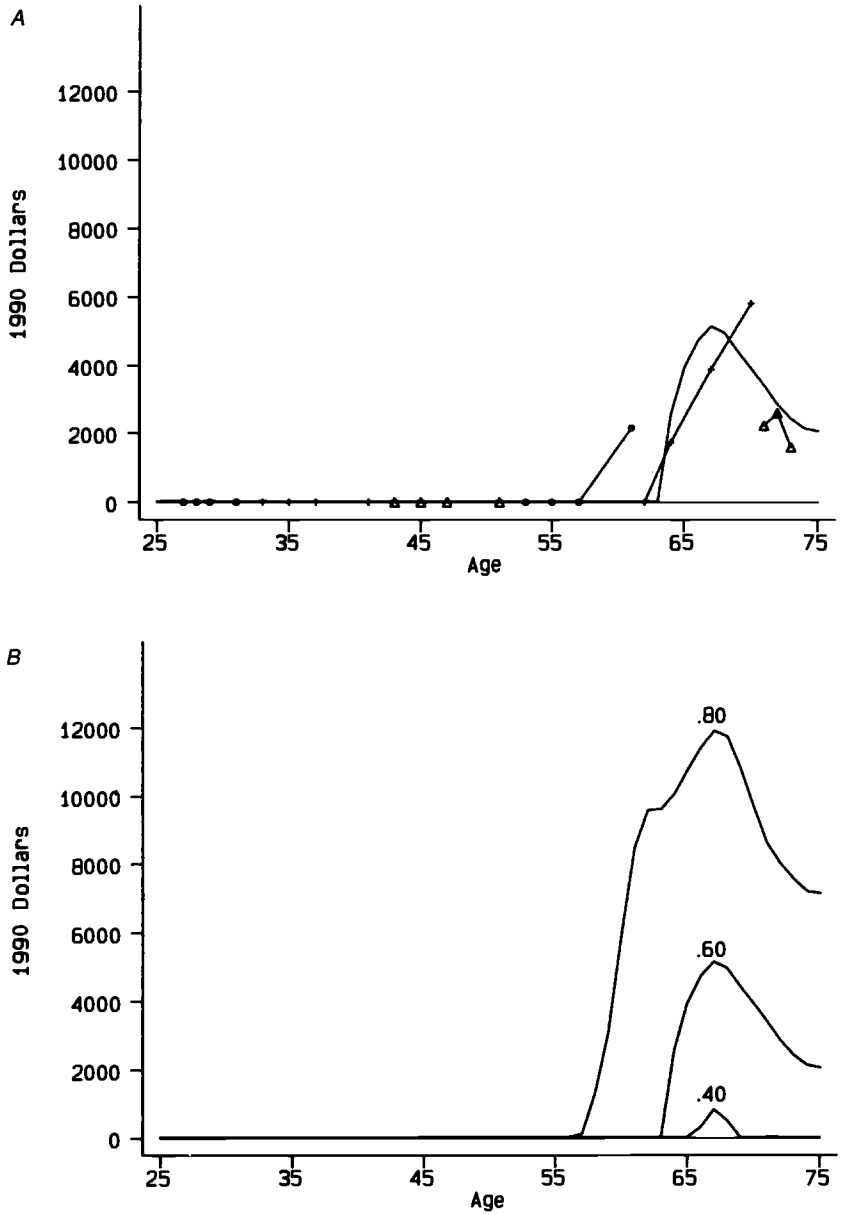


Fig. 1.5 Quantiles for other income

Note: The bandwidth is 5. (*A*) Cohort and smoothed .6 quantiles. (*B*) Kernel-smoothed quantiles.

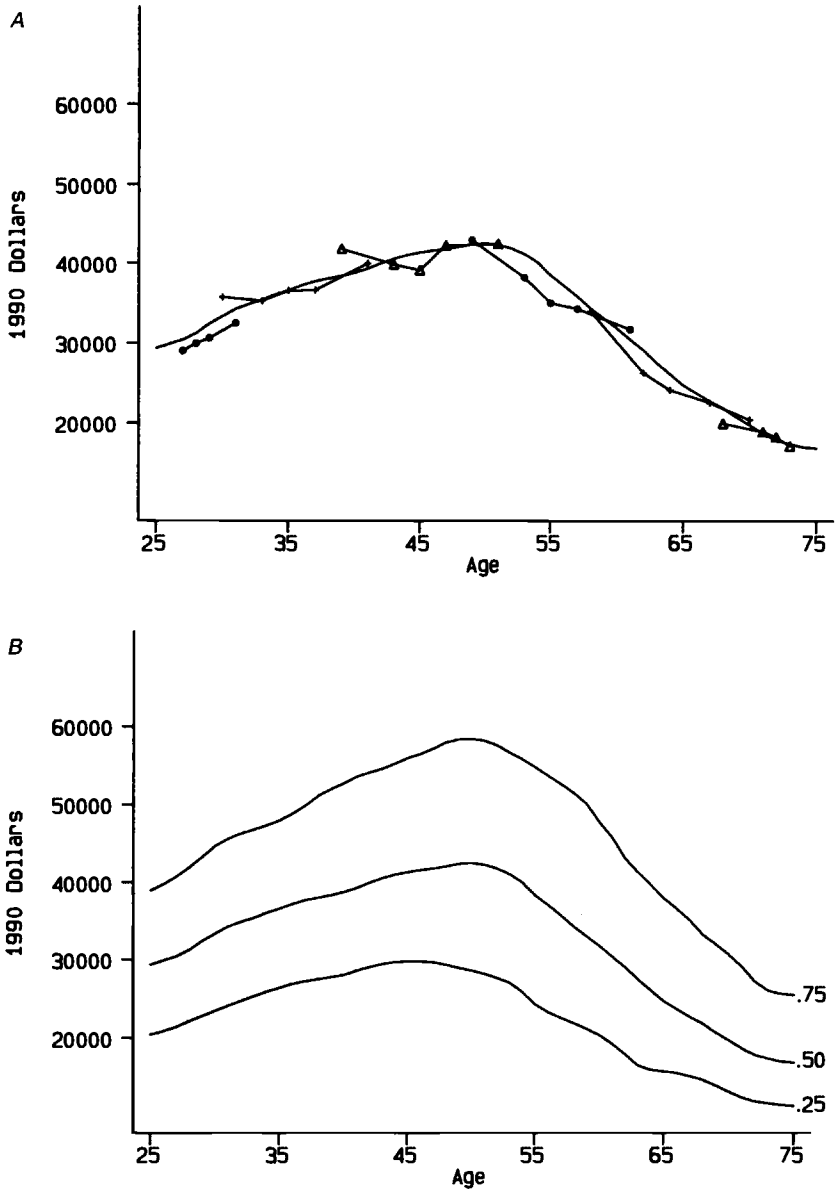


Fig. 1.6 Quantiles for after-tax income

Note: The bandwidth is 7. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

Table 1.8 **Replacement Rates for Various Income Measures, Years and Quantiles**

	Pretax Income	After-Tax Income	Government Transfer Income/Earnings
Year			
1978	0.36	0.43	n.a.
1982	0.39	0.47	0.21
1984	0.39	0.48	0.22
1986	0.35	0.45	0.20
1990	0.41	0.49	0.22
Quantile			
.25	0.38	0.45	2.52
.5	0.38	0.47	0.24
.75	0.46	0.53	0.20

C/QPP Contributions

Having looked at what retirement income spending units receive from public and private sources it is of some interest to know what contributions they make prior to retirement. Since major components of the public system (e.g., OAS and GIS) are financed out of general revenue we can trace only contributions to C/QPP. Over our data period, employee contribution rates have been about 2 percent of earnings up to a three-year moving average of the average industrial wage, roughly $550 per annum. The raw cohort median trajectories in figure 1.7*A* show that rates have been rising over time.

Contributions to Other Pension Plans (not RRSPs)[19]

About one-half of all employees are members of private pension plans. In the FAMEX data median contributions are zero, or very close to zero, for all years 1978–90. Therefore we graph the .75 quantile in figure 1.8*A*. This figure shows that, broadly speaking, contributions have risen over the data period, although not smoothly. However, relative contributions fell in 1986 and 1990 early in the life cycle and before retirement. The latter presumably reflects the trend towards earlier retirement. The former suggests that younger households may be increasingly likely to hold jobs in companies that do not have pension plans and are using RRSPs to save for retirement (see fig. 1.15*A*).

19. We should emphasize that this item, like C/QPP taxes and life insurance premiums, is excluded from our measure of saving.

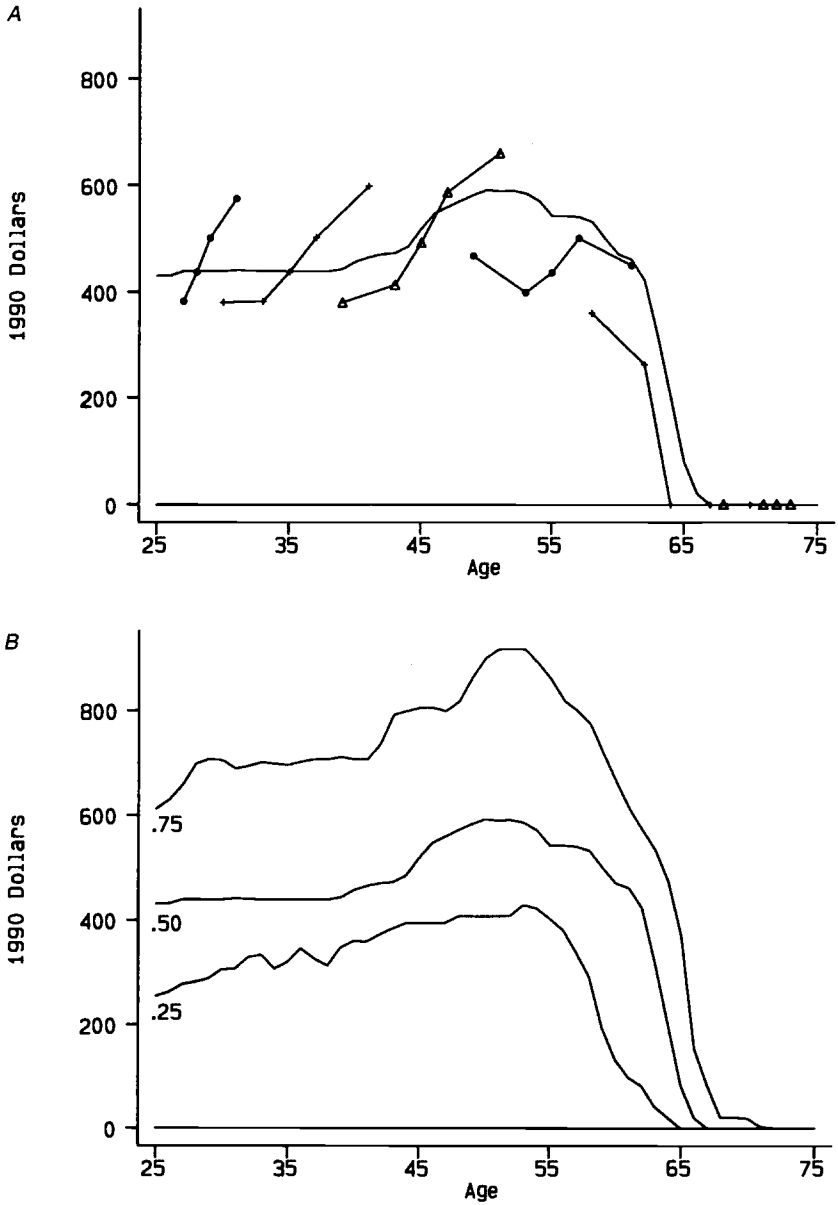


Fig. 1.7 Quantiles for Canada and Quebec Pension Plan contributions
Note: The bandwidth is 3. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

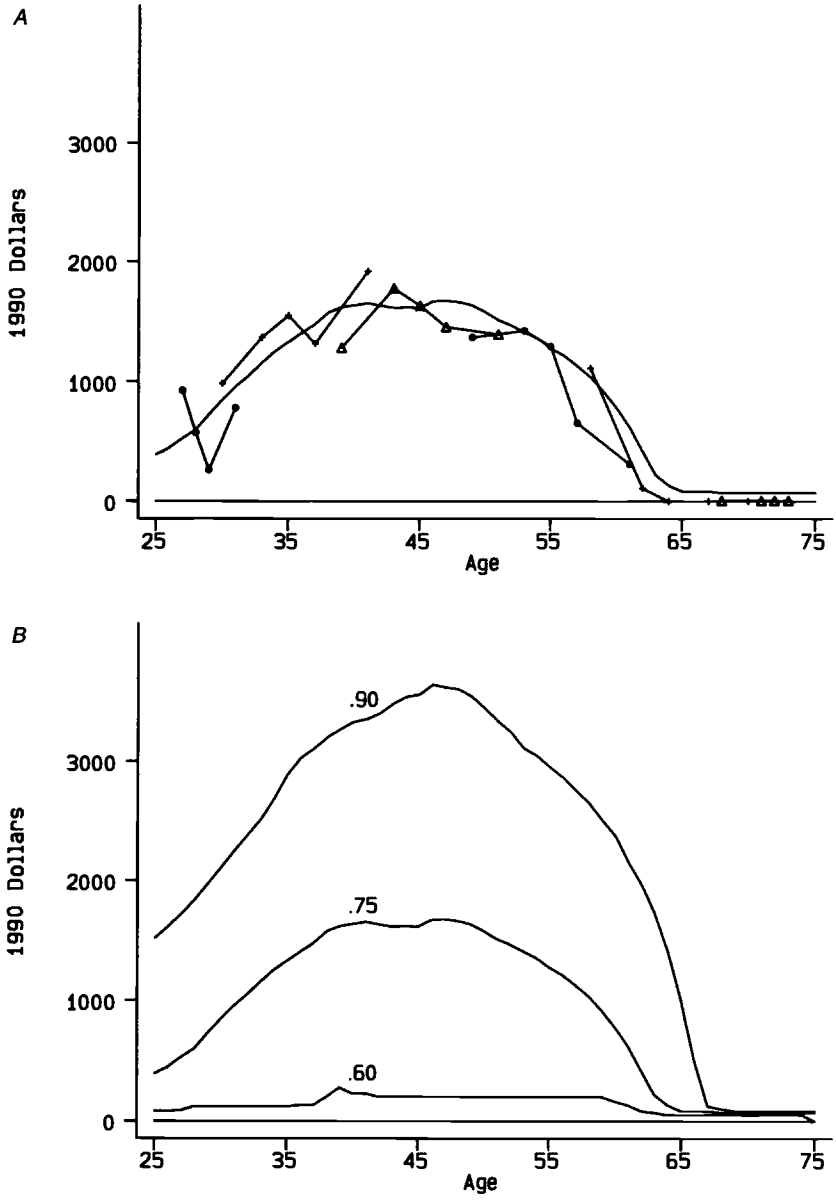


Fig. 1.8 Quantiles for other pension plan contributions

Note: The bandwidth is 8. (*A*) Cohort and smoothed .75 quantiles. (*B*) Kernel-smoothed quantiles.

1.4.2 Consumption

Total Consumption

Figure 1.9*A* shows that the median total consumption profile is similar to that of after-tax income. An interesting aspect of the year effects is the sharp upturn in the raw cohort medians from 1984 to 1986. That this did not occur for after-tax income means that saving dropped sharply in 1986. Like income, however, figure 1.9*B* shows that consumption quantiles tend to fan out until they peak and then the .25 quantile moves closer to the median later in the life cycle. Also note that all the consumption quantiles peak at about the same age, around 45. This is about the same age as the income peak for the .25 quantile, but is earlier than the income peak for the higher quantiles, suggesting that we should see an increase in their relative saving past about age 45 in later figures.

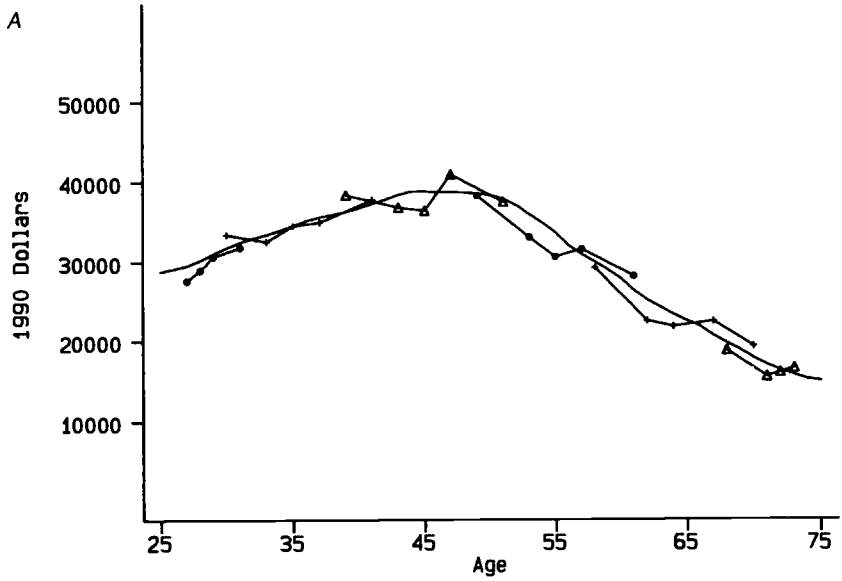
Martin Browning (1992) has documented how important familial interactions are to an understanding of consumption patterns. Figures 1.9*A* and 1.9*B* are drawn without controlling for family size. Figure 1.9*C* uses adult-equivalence scales to illustrate the idea that much of the hump-shaped pattern in consumption vanishes when one controls for family size but that there is still a significant decline (about 25 percent) in consumption during retirement (see Robb, Magee, and Burbidge 1992). Browning (1992, 1444, table 2) shows that existing empirical studies place only weak restrictions on what scale one employs. Figure 1.9*C* uses the weighting in Robb, Magee, and Burbidge—head 1.0, spouse 0.5, other adult 0.5, first child 0.3, and other children 0.15.

Nondurables

Consumption of nondurables comprises about three-quarters of total consumption. Figure 1.10*A* shows that nondurable consumption peaks later than total consumption and that the profile is flatter. Year effects and quantile differences are similar to those for total consumption.

Durables

The differences between total and nondurable consumption profiles are explained by the durables consumption profile shown in figure 1.11. As one might expect, expenditures on durables are skewed toward the first half of the life cycle. We have an early peak, and a decline to a low level of expenditure above about age 60. When young, median households are spending between $6,000 and $8,000 on durables. This expenditure in fact reflects capital accumulation more than consumption and is impressive relative to the "regular" median saving of between $1,000 and $2,000 per year reported in table 1.3.


A
1990 Dollars
50000
40000
30000
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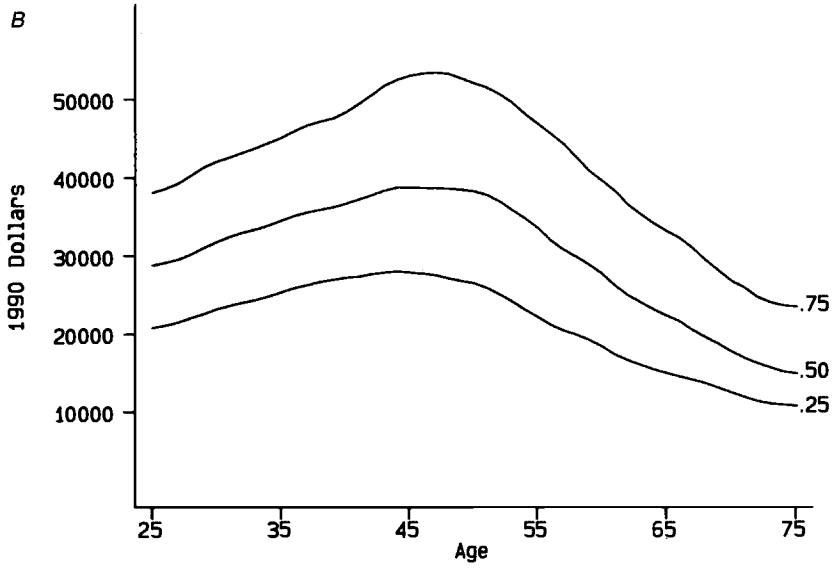
25
35
45
55
65
75
Age


B
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Age

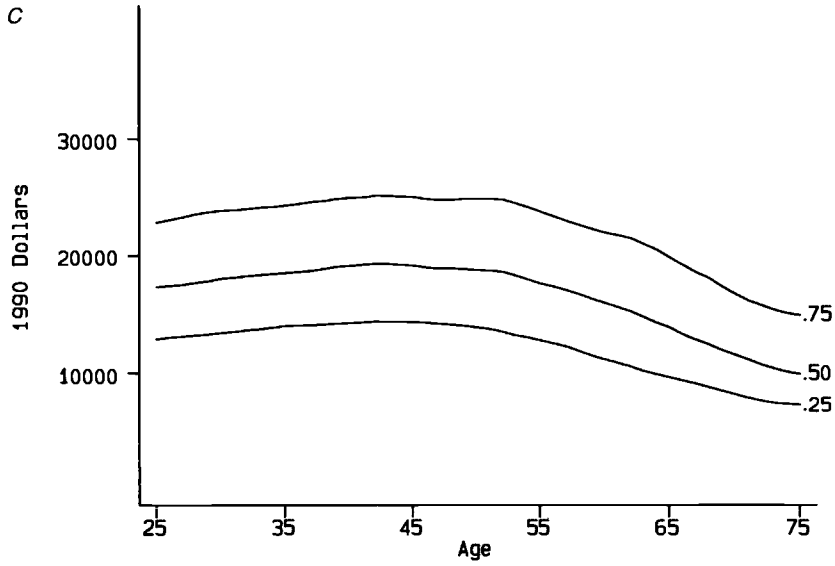

Fig. 1.9 Quantiles for total consumption
Note: The bandwidth is 7 for panels (*A*) and (*B*), and 9 for (*C*). (*A*) cohort and smoothed medians. (*B*) Kernel-smoothed quantiles. (*C*) Kernel-smoothed quantiles using an adult-equivalent scale.

Health Expenditures[20]

Figure 1.12*A* shows that median health expenditures have a hump-shaped age profile, peaking at about age 45. The hump is very similar to, and is essentially explained by, that in family size. This suggests that while there may well be some precautionary saving motivated by concerns about health expenditures, this phenomenon exists at all ages and is not especially related to saving for retirement. Also note that for the older groups there is a distinct cohort effect, with younger cohorts having higher expenditures at a given age. Figure 1.12*B* shows that quantiles fan out to a peak near age 50 and then move closer together. In addition, it would appear that at any age, the gap between the .75 quantile and the median is larger than the gap between the median and the .25 quantile. A comparison with figure 1.9*B* shows that health expenditures are more unequal and more skewed at all ages than is total consumption. There may be households in the top quartile who spend very large amounts on health care.

1.4.3 Saving

This subsection combines the numbers generated in the previous two sections to study saving, which is defined to be after-tax income less consumption.

20. At all ages, health expenditures for 1978 are about one-third of those for 1982. Statistics Canada's public-use microdata tape documentation does not admit the possibility of obtaining a consistent definition of health expenditures for these two years. Here we focus on 1982–90.

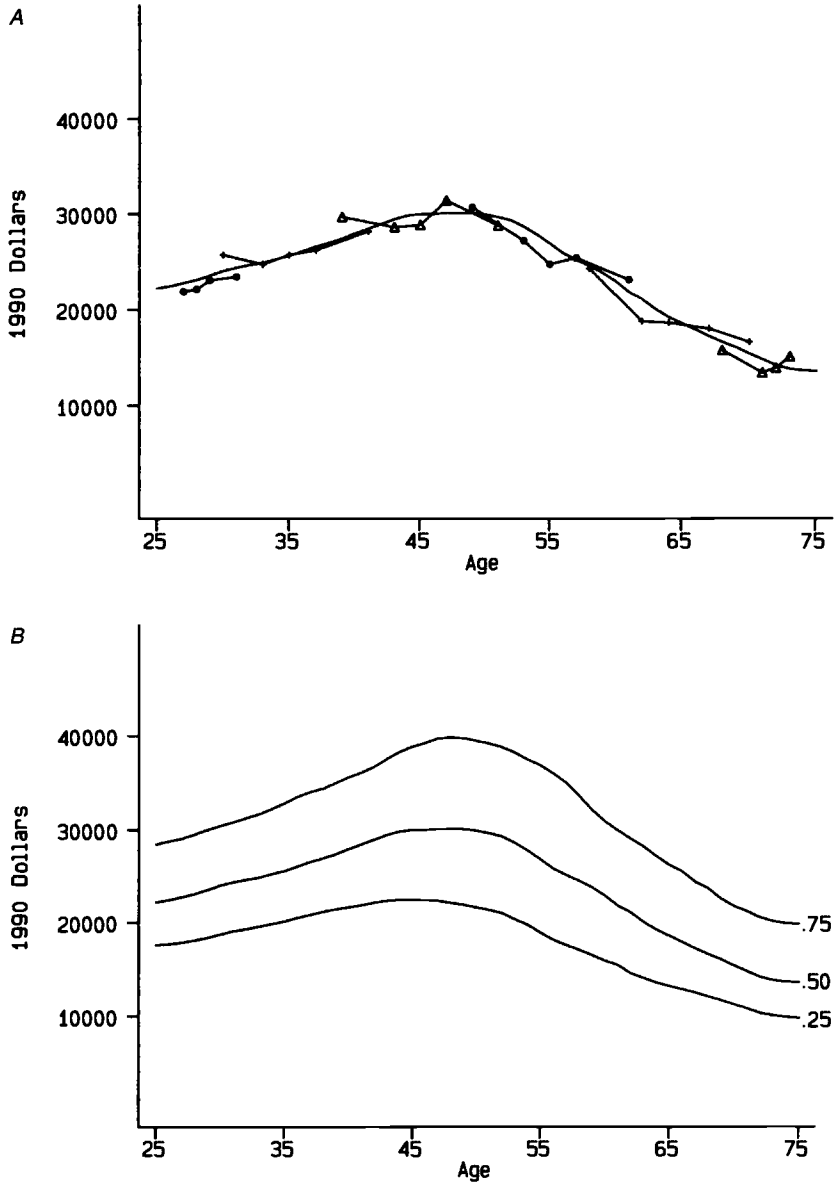

Fig. 1.10 Quantiles for nondurable consumption
Note: The bandwidth is 8. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

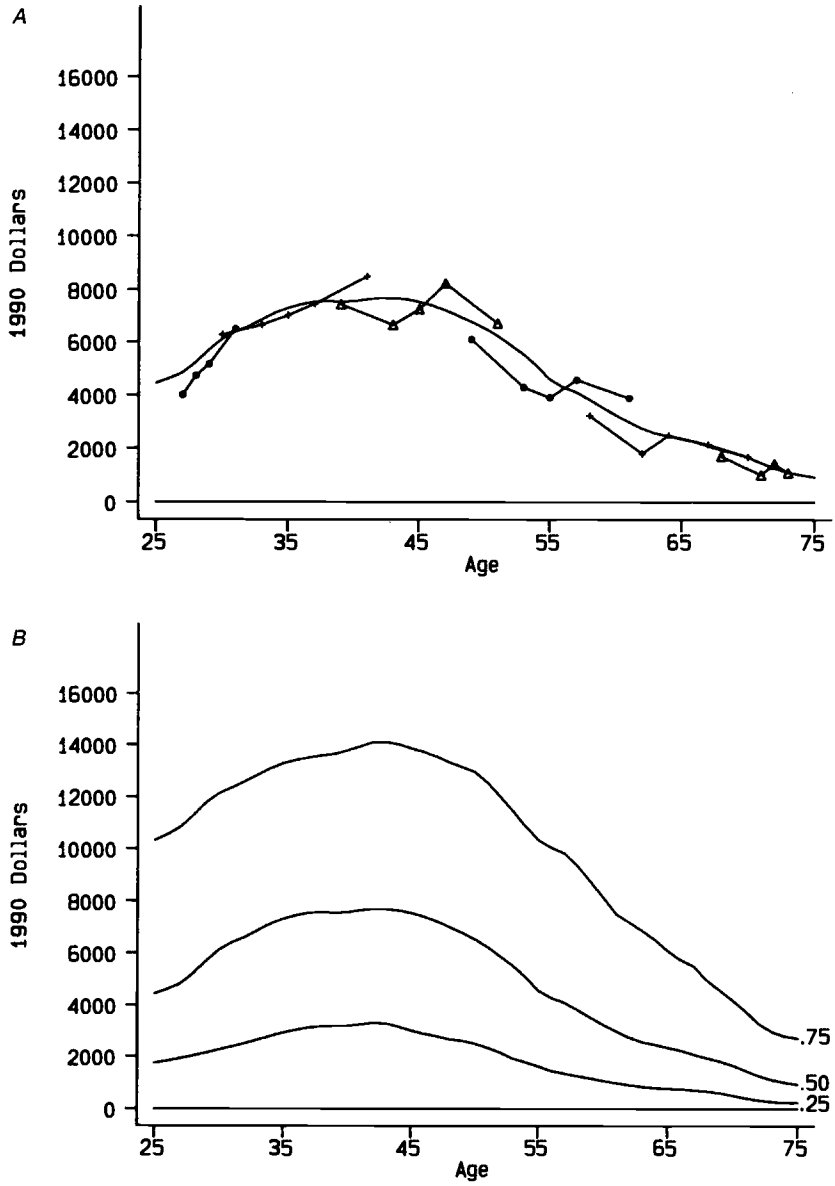

Fig. 1.11 Quantiles for durable consumption

Note: The bandwidth is 7. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

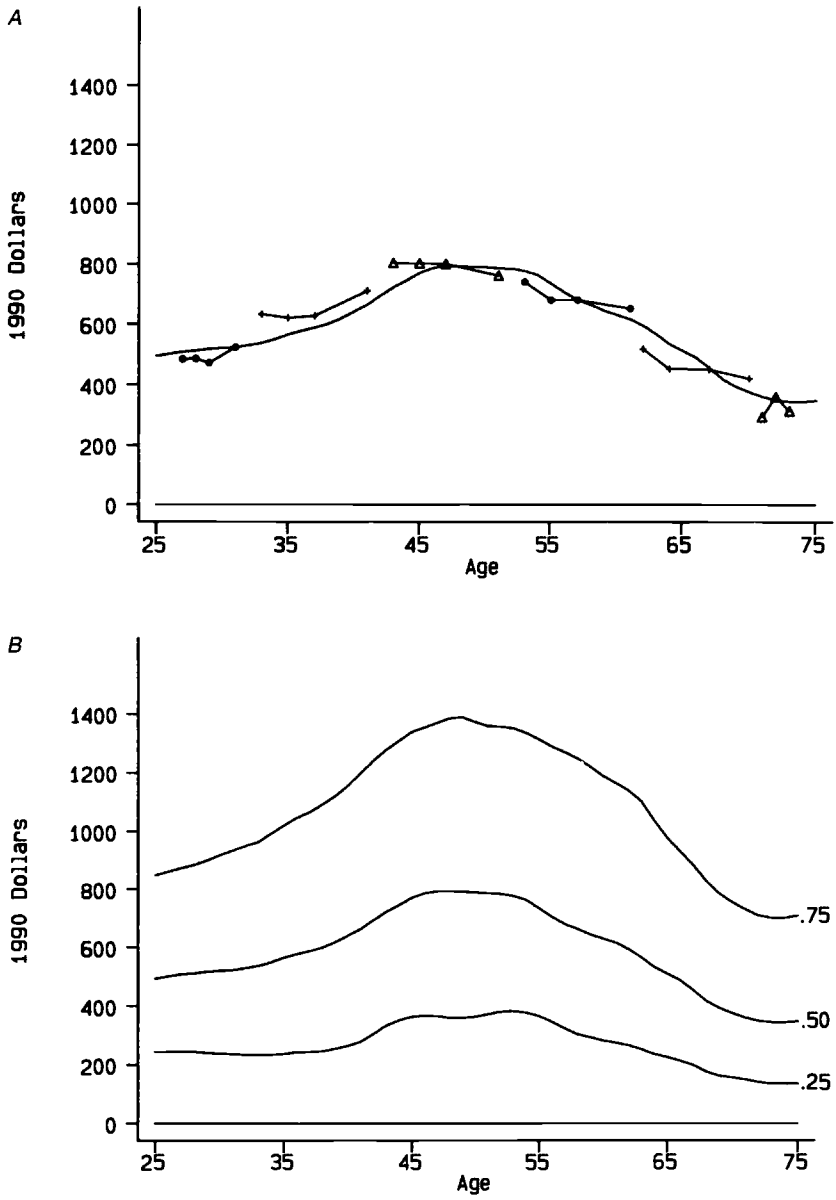

Fig. 1.12 Quantiles for health expenditures

Note: The bandwidth is 9. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

One might be tempted simply to overlay the after-tax income and total consumption quantiles to get a picture of saving. Unlike averages, however, the difference of the medians is not the median of the difference. As with other variables studied in this paper we must first construct saving for each household and then examine its distribution conditional on age.

Saving

Like after-tax income and consumption, saving is hump shaped. It peaks near age 55, which is later than income or consumption. It then declines between ages 55 and 65 and is quite flat after age 65. Figure 1.13*A* shows strong year effects, as one would anticipate from our discussion of table 1.6. There is a marked trough for most age groups in 1986, and peaks in 1982 and 1990. As in our discussion of capital income above, it is important to note that including capital gains in income and removing the purely inflationary component from capital income would have a marked effect on the apparent year effects. As noted above, Dagenais (1992) performs such an exercise at the aggregate level for Canada up to 1985. He finds that, in contrast to the picture shown here, 1982 was a low-saving year. Measured saving is highly volatile in his time series, so that year effects would be much larger in our exercise if we performed similar adjustments for capital gains and inflation.

Figure 1.13*B* shows that, at any age, more than one-fourth of all households dissave and that the hump shape is more pronounced the higher the quantile.

Saving Rates

Among other things, changes in tax structure redistribute income across private households. If all households had the same marginal propensity to save then aggregate private saving would be unaffected, on this account, by a (balanced-budget) change in tax policy. Therefore, it is important to know how marginal propensities to save vary across households. We do not have panel data, and thus we cannot observe the change in saving in response to a change in income for any household. In the next few paragraphs we present some information on saving rates out of after-tax income, defined to be saving/after-tax income,[21] in the hope that such information may suggest important determinants of *marginal* propensities to save. The household saving rates so generated may be very large positive or negative numbers. Our data contain some huge outliers, to such an extent that the average saving rate is meaningless. We think this is a setting where quantile estimation is extremely helpful.

From figure 1.14*A* one can see that saving rates rise gently to about age 60 and then fall slightly to age 75. Year effects similar to those for total saving (fig. 1.13*A*) are found. Figure 1.14*B* shows that saving rates at many quantiles rise to age 60 and then fall a little. Once again, at any age, more than one-

21. For the purposes of this section, any household with zero income is assigned an income of $1.

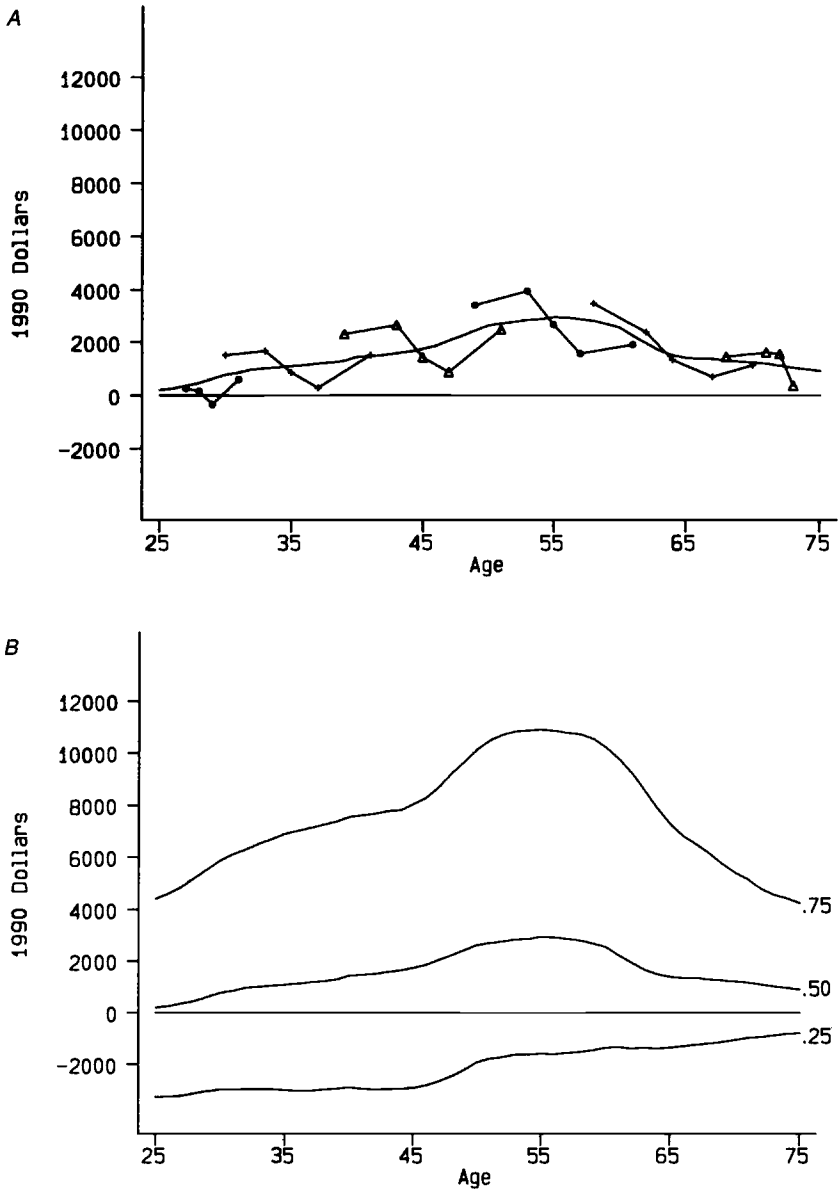

Fig. 1.13 Quantiles for personal saving

Note: The bandwidth is 10. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

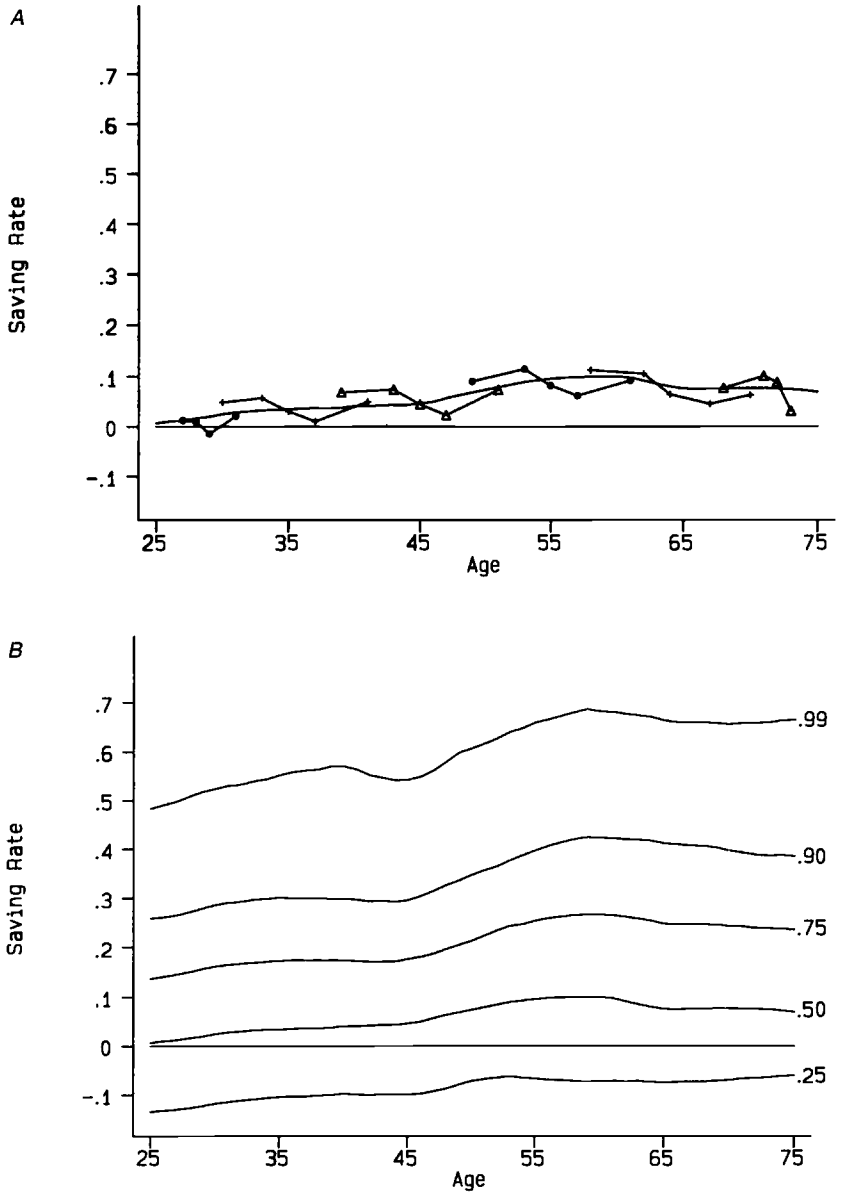

Fig. 1.14 Quantiles for personal saving rate

Note: The bandwidth is 10. (*A*) Cohort and smoothed medians. (*B*) Kernel-smoothed quantiles.

fourth of families have negative saving rates. It is also interesting to observe how the quantiles spread out at higher values.

An important question concerns the extent to which the pattern of saving rates shown here depends on our inclusion of families of all types, and the varying importance of different kinds of families with age. In an earlier version of this paper we standardized for family type by confining our attention to married-couple families. When that is done, saving rates at the various quantiles are somewhat higher, except for the .99 quantile. The saving rate for the .99 quantile is lower for married couples than for all families taken together. This indicates that, while most unattached individuals have lower saving rates than married couples, there is a small group of such individuals with extremely high saving rates. Importantly, there is little change in the age pattern of saving rates when married couples, rather than all types of family units, are examined. This suggests that lack of standardization for family type is not biasing our assessment of the age pattern of saving.

It should be emphasized again, as in our earlier discussion of table 1.1, that according to these FAMEX data, personal saving rates in Canada vary much more across income quantiles than they do with age. Figure 1.14*B* makes this very clear.

Change in RRSP Holdings

As noted above, the FAMEX structure requires an estimate of each household's net change in assets and liabilities, and the one category reported on the public use tapes is net change in RRSP holdings. Figure 1.15*A* shows that prior to retirement about one-quarter of families make significant additions to their RRSPs each year (the median is zero for all years). It also shows a very strong cohort effect: contributions at any given age have been trending upward over the data period. The absence of a similar cohort effect for total saving indicates that there is a compositional switch in saving vehicles toward greater use of RRSPs. Burbidge and Davies (1994) argue that this is due to a closing down of many alternative tax shelters for saving in the 1980s.

Figure 1.15*B* shows a wide range of quantiles. Note first, that all quantiles between .10 and .60, inclusive, are very close to zero. That is, there is a very large group, at any age, making no RRSP contributions or withdrawals. (It would be quite consistent with this for the majority of spending units to make contributions and withdrawals at some point in their lives. There may be many spending units for which such transactions occur in only a few years.) Second, note that it is only a very small minority who are making RRSP withdrawals at any age. It is not until past age 65, for example, that the .05 quantile dips below the zero axis. In part this may reflect the general lack of dissaving in retirement, and in part it may simply point to a data problem. Finally, on average it is only about 25 percent of spending units who are contributing to RRSPs at any particular age.

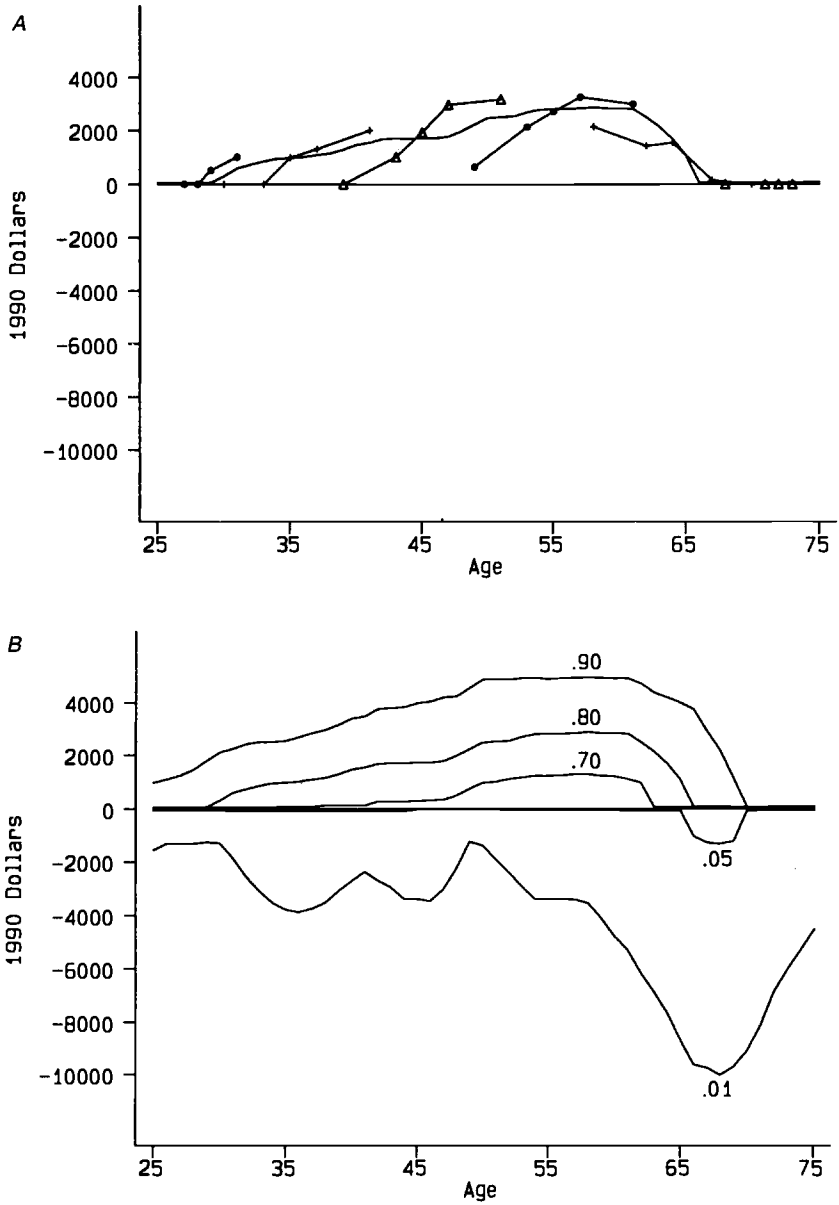

Fig. 1.15 Quantiles for the change in RRSPs

Notes: The bandwidth is 8. All quantiles between .10 and .60 are virtually zero. (*A*) Cohort and smoothed .8 quantiles. (*B*) Kernel-smoothed quantiles.

1.4.4 Wealth

We now turn to the SCF data for 1977 and 1984 to study the age dependence of net worth and its components. It is impossible to identify year, cohort, and "pure" age effects with just two cross sections, so the previous format cannot be adopted here. In the first draft of this paper we graphed age profiles for each cross section separately and found the shapes of the profiles to be quite similar. Accordingly, we now pool the two SCF data sets. The *A* graphs for each variable depict raw and smoothed medians; the *B* graphs show the median and other quantiles.

Net Worth

Figure 1.16*A* shows that net worth, i.e., total assets minus total debts, rises with age to 48, flattens out until age 63, and declines thereafter. As mentioned earlier, this hump shape cannot be taken as confirmation of the naive LCM, although such an interpretation is tempting. The danger of such an interpretation is suggested by the positive median saving rates we have found at all ages up until age 75.[22] Figure 1.16*B* shows that the net worth quantiles fan out with age, and that the higher quantiles have a more strongly peaked age profile.

It is interesting to note in figure 1.16*A* that the data are quite noisy after age 48. Given that we are looking at quantiles and that the sample sizes are quite large, this is striking. The noisiness of the data is behind the bumpiness of the age profile which comes through despite the use of a bandwidth of seven years. A smoother profile would be obtained if the kernel-smoothing procedure allowed longer bandwidths to be selected in particular age ranges where the data are noisier. Also note that higher-quantile age profiles are less smooth. Again, if our smoothing procedure allowed different bandwidths for different quantiles this differential bumpiness would likely be reduced.

Net Financial Assets

Median net financial assets rise with age until 65 and then fall slightly. Note, however, that these assets are not large relative to median net worth at any age, and that they are particularly small up to age 45. Thus, for the *typical* Canadian household most saving takes place in nonfinancial form, and this is especially true for young households. Figure 1.17*B* shows that financial assets are relatively much more important for higher quantiles. The .75 quantile, for example, has peak net financial assets over $60,000, which is more than a quarter of the peak for the .75 net worth quantile. If we penetrated further into the upper tail of the distribution we would find net financial assets becoming even more important. Given the skewness of the wealth distribution, if we therefore

22. Recall that net worth has a downward bias for at least two reasons. First, "total assets" ignores any equity the family may have in private pension plans or life insurance. Second, consumer durables other than housing and automobiles are excluded from "total assets," but money borrowed to purchase any consumer durable is counted as part of "total debt."

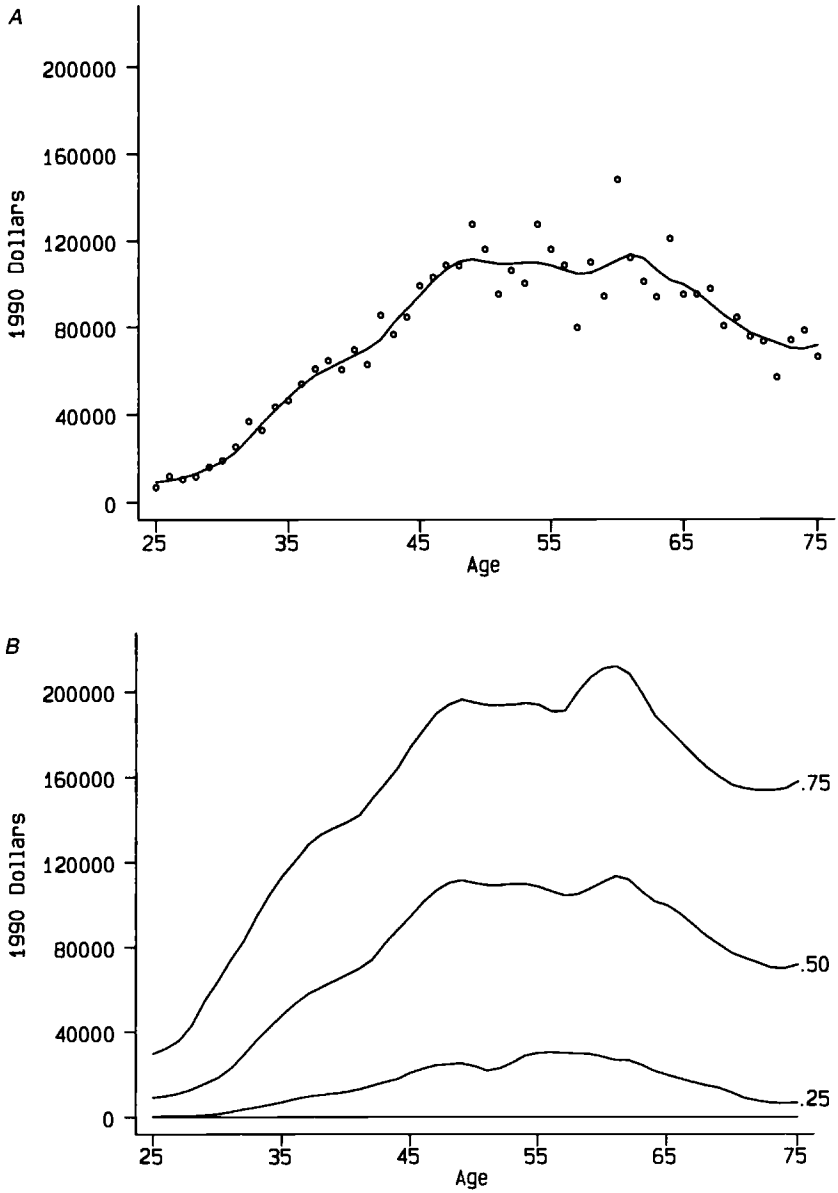

Fig. 1.16 Quantiles for net worth

Note: The bandwidth is 7. (*A*) Raw and smoothed medians. (*B*) Kernel-smoothed quantiles.

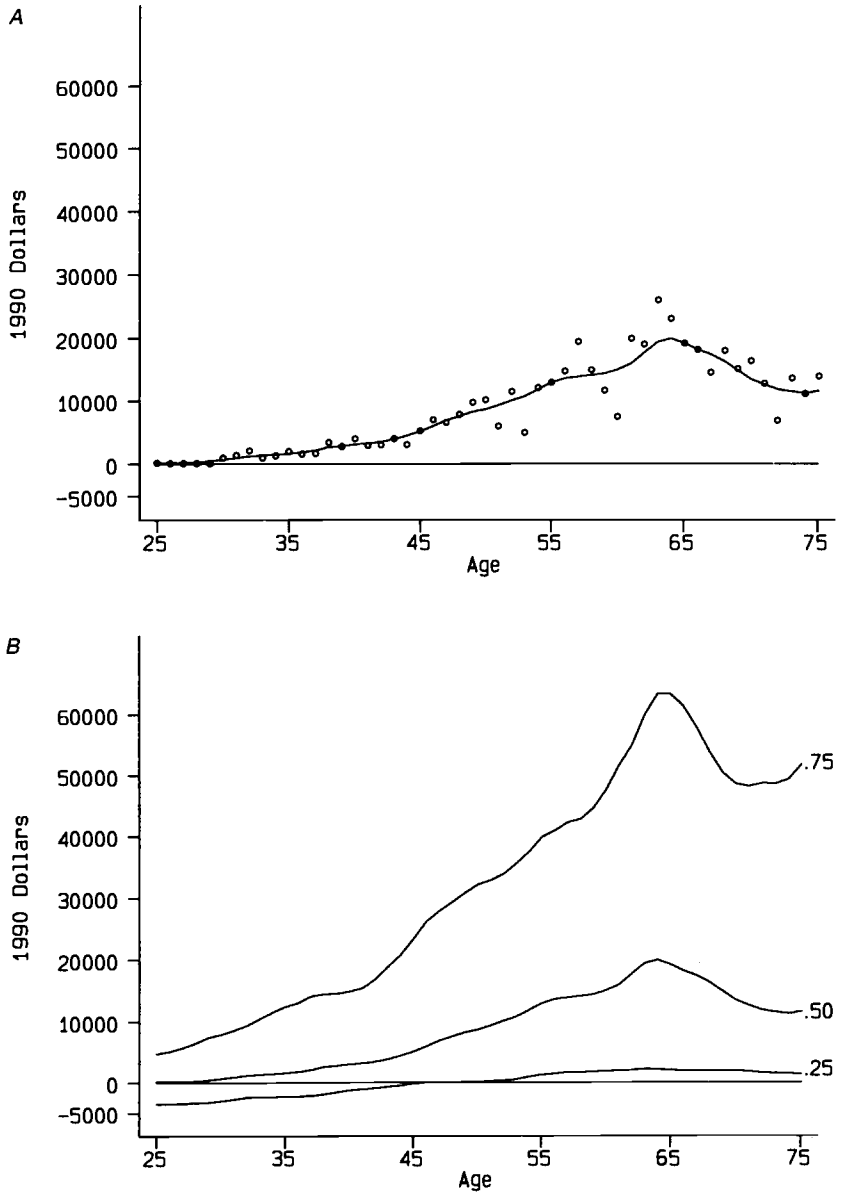

Fig. 1.17 Quantiles for net financial assets

Note: The bandwidth is 8. (*A*) Raw and smoothed medians. (*B*) Kernel-smoothed quantiles.

looked at means, rather than medians, net financial assets would appear to be considerably more important "on average" than figure 1.17*A* suggests.

It is also interesting to compare the age profiles of owners of net financial assets with those of the corresponding flow, capital income (see fig. 1.3). The capital income profiles show less of a hump shape. This suggests some caution in accepting that median net financial assets decline significantly in retirement.

Home Equity

Figure 1.18*A* shows median home equity for home owners. This rises to about age 45 and then is remarkably flat with age. The quantiles shown in figure 1.18*B* are very similar. Note that the quantiles fan out slightly at early ages, but in contrast to net financial assets are, overall, very similar in shape.

Finally, figure 1.19 indicates a rapid rise in the proportion of home owners up to about .75 at age 45, and only a small decline in this fraction at advanced ages. This confirms the great importance of investment in owner-occupied accommodation as a form of saving for young Canadians.

1.6 Summary and Conclusions

We have presented a summary of what Canadian microdata sets have to say about the variation of income, consumption, saving, and wealth both across quantiles and over the life cycle. All of these variables and their components exhibit age dependence. Of all the variables studied, saving rates out of disposable income were least dependent on age; here intracohort variation appears to dominate. Tax policies that redistribute income across low- and high-income households within age groups, rather than policies that redistribute across households with similar incomes but different ages, are more likely to affect aggregate saving.

Other important themes have emerged. For example, there is a general message that it is not safe to assess age patterns of consumption, saving, or wealth holding using isolated cross-sectional data. While this is not the case for *all* variables, cohort and year effects are often quite strong. Another finding is that Canadians save in essentially two phases. When young they do so by building up home equity. It is only in middle age that most make the transition to saving in the form of pension rights and financial assets. This suggests, as we believe is echoed in the studies for other countries, that the institutional structure and tax provisions affecting home ownership, mortgage lending, and speed of buildup of home equity are a very important determinant of the overall personal saving rate in Canada. Finally, in common with several recent studies, we find that continued saving after retirement is more the rule than the exception. This paper thus repeats the challenge to the naive life-cycle model as an organizing tool for thinking about personal saving.

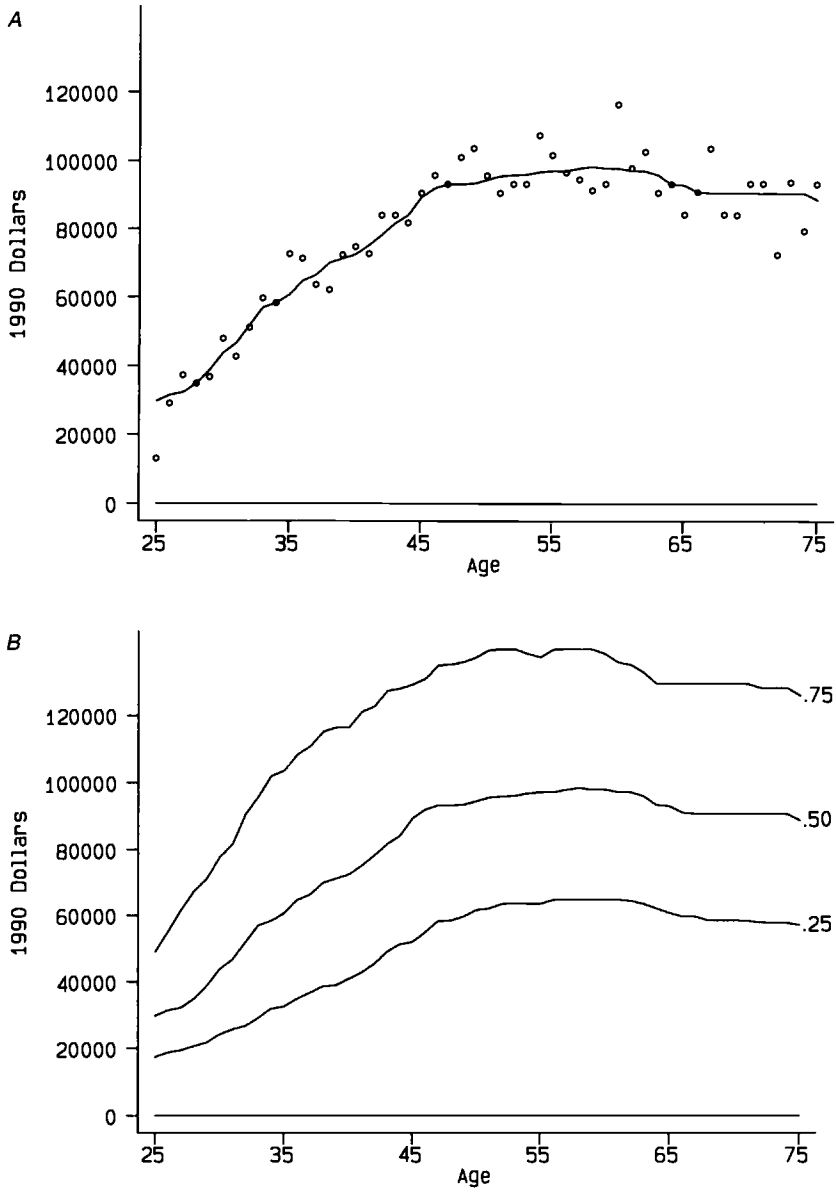

Fig. 1.18 Quantiles for equity in owner-occupied homes

Note: The bandwidth is 10. (*A*) Raw and smoothed medians. (*B*) Kernel-smoothed quantiles.

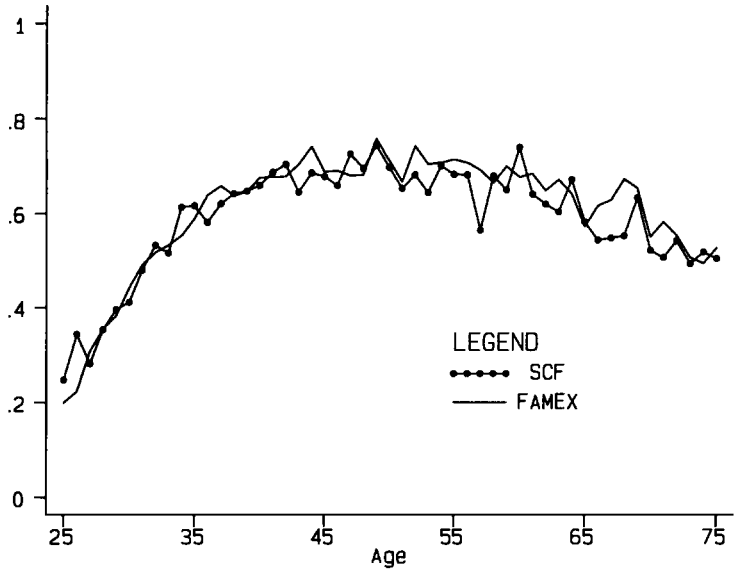

Fig. 1.19 Proportion of home owners by age

Table 1A.1 Numbers of Observations by (After-Tax) Income Quintile and Age Group

Income quintile	All	Age Group <29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	>74
1	994	154	139	124	112	76	82	69	57	57	43	70
2	953	145	129	129	101	85	67	64	59	54	39	71
3	942	144	131	112	103	75	61	68	56	58	51	61
4	916	136	139	121	105	72	67	57	47	52	59	63
5	764	126	112	94	83	74	59	45	42	57	46	67
All	4,569	705	650	580	504	382	336	303	261	278	238	332

Source: FAMEX for 1990 (all observations).

Table 1A.2 Numbers of Observations by (After-Tax) Income Quintile and Age Group

	All	Age Group <25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	>74
1	2,755	216	315	336	311	276	219	219	220	200	171	138	184
2	2,919	208	330	339	294	254	217	235	233	213	177	141	179
3	2,842	212	322	313	303	232	218	238	218	212	191	166	195
4	2,779	217	316	331	294	255	213	214	206	217	185	158	190
5	2,734	222	326	310	297	244	213	231	215	203	172	147	208
All	14,029	1,075	1,609	1,629	1,499	1,261	1,080	1,137	1,092	1,045	896	750	956

Source: SCF for 1984 (all observations).

References

Bar-Or, Yuval, John B. Burbidge, Lonnie Magee, and A. Leslie Robb. 1992. Canadian experience-earnings profiles and the return to education in Canada: 1971–1990. McMaster University. Mimeograph.

Browning, Martin J. 1992. Children and household economic behavior. *Journal of Economic Literature* 30:1434–75.

Burbidge, John B., and James B. Davies. 1994. Government incentives and household saving in Canada. In Public policies and household saving, ed. James M. Poterba, 19–56. Chicago: University of Chicago Press.

Burbidge, John B., and A. Leslie Robb. 1985. Evidence on wealth-age profiles in Canadian cross-section data. *Canadian Journal of Economics* 18:854–75.

Burbidge, John B., Lonnie Magee, and A. Leslie Robb. 1988. Alternative transformations to handle extreme values of the dependent variable. *Journal of the American Statistical Association* 83:123–27.

Dagenais, Marcel G. 1992. Measuring personal savings, consumption, and disposable income in Canada. *Canadian Journal of Economics* 92:681–707.

Davies, James B. 1979. Life cycle saving, inheritance and the distribution of income and wealth in Canada. Ph.D. Thesis. University of London.

———. Forthcoming. The distribution of wealth in Canada. In *Research in Economic Inequality,* ed. E. Wolff, vol. 4. New York: Academic.

Magee, Lonnie, John B. Burbidge, and A. Leslie Robb. 1991. Computing kernel-smoothed quantiles from many observations. *Journal of the American Statistical Association* 86:673–77.

Oja, Gail. 1986. The wealth of Canadians: A comparison survey of consumer finances with national balance sheet estimates. Labour and Household Surveys Analysis Division Staff Reports. Ottawa: Statistics Canada.

Robb, A. Leslie, and John B. Burbidge. 1989. Consumption, income and retirement. *Canadian Journal of Economics* 22:522–44.

Robb, A. Leslie, Lonnie Magee, and John B. Burbidge. 1992. Kernel smoothed consumption-age quantiles. *Canadian Journal of Economics* 25: 669–80.

Siddiq, Fazley K., and Charles M. Beach. 1993. Characterizing life-cycle wealth distributions in Canada using dominance criteria. Discussion Paper no. 886. Institute for Economic Research. Queen's University.

Statistics Canada. 1992. Documentation for the public use microdata tape for the 1990 Family Expenditure Survey. Ottawa: Statistics Canada.

———. 1993. The relationship between estimates from the 1986 FAMEX and data in the National Accounts. Ottawa: Statistics Canada. Unpublished.