Income Security Programs
The Interaction of Public Pensions and Retirement Decisions in Canada

Final Report

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Executive Summary

This is an examination of the financial incentives implied in the Canadian public retirement program, namely those of the current public "safety net" programs for seniors — Old Age Security (OAS), and the Canada/Quebec Pension Plan (CPP/QPP). It models the financial incentives for continued work force attachment, or retirement, which are implied in the current public pension programs and income tax system for individual workers under a restricted set of household assumptions (e.g., with uninterrupted earnings histories, mainly at median earnings, entitled to a full CPP/QPP pension). In these cases, the structure of these public retirement plans leads to both taxes and subsidies to individuals considering retirement at different ages.[1]

Government transfers to older persons in Canada through the Canada/Quebec Pension Plan, Old Age Security (the basic benefit), the associated Guaranteed Income Supplement (GIS), and the Spouse's Allowance (SPA) are one of the largest and fastest growing components of the government budget. Total expenditures on the four primary transfer programs (CPP, OAS/GIS/SPA) for older Canadians amounted to $41 billion in 1995, which was 23% of the federal budget and 5.3% of Gross National Product (GNP) in that year. In 1970, total expenditures were only $2 billion, amounting to just 14% of the federal budget and 2.3% of GNP. Moreover, even with the recently announced revisions to the CPP/QPP, rapid growth in these programs for seniors appears likely in the future. The ratio of persons 65 and over to persons 20-64 is projected to grow from its current level of 19% to over 40% by the year 2075. The payroll tax necessary to finance the major social insurance program for older persons, the Canada/Quebec Pension plan, is scheduled to grow from its current level of 7.0% of wages to over 9.9% by the year 2003 and stabilize at that level by the year 2010. Similar cost increases are also in store for the other three major transfer programs to older Canadians, which are financed from general revenues: the Old Age Security demogrant, and the income-tested Guaranteed Income Supplement and Spouse's Allowance programs.

The OAS program will grow in cost as the population ages; however, its growth in relation to GDP will depend on the relative growth of prices, compared to economic growth, since OAS benefits are linked to the CPI

1 This analysis does not take into account the changes to the CPP, which took effect in 1998. See Federal Budget, March 6, 1996, and Finance Canada, Securing the Canada Pension Plan, February 17, 1997. Prior to the reforms, the CPP contribution rate was projected to increase to 14.2% by 2030 in order to pay for promised benefits.

(Consumer Price Index) rather than wages; starting values of CPP retirement pensions, on the other hand are linked to wages. But for understanding the implications of any potential reforms, it is critical to understand how this complicated web of programs affects the retirement decisions of older Canadians. For the median household where the head is over age 65, these four social security programs represent 61% of total family income; for 23% of such households, they provide more than 90% of family income.[2] As a result, it seems likely that the structure of the social security program has important effects on the life cycle savings and labour supply decisions of households, and in particular on their retirement decisions. But there has been little empirical analysis of either the retirement incentives under the Canadian system, or the effects of those incentives on labour market behaviour of older workers.

The purpose of this paper is to provide an overview of the interaction between social security programs and the labour force behaviour of older persons in Canada. This is provided in four steps. Part I documents the pertinent facts about the labour market behaviour of older persons in Canada, both today and over time. Part II describes the structure of the system of income support programs for older persons in Canada, summarizing the relevant institutional details for thinking about retirement behaviour. Part III presents the results of a simulation model designed to document the retirement incentives inherent in these programs for current cohorts of retirees under certain restricted assumptions. Finally, Part IV concludes by considering the implications of the findings.

2 Author's tabulations of the 1992 Survey of Consumer Finances.

1. The Labour Market Behaviour of Older Persons in Canada

As in most industrialized nations, the second half of the 20th century in Canada has been marked by a declining attachment to the labour force of older persons. In 1960, 87% of men aged 55-64 and 30% of men age 65 and above were participating in the labour force; by 1993, these ratios had fallen to 61% and 10%, respectively. One possible explanation for this shift is the increasing generosity of the income support programs for older Canadians. But before addressing the effects of these programs, it is useful to provide some more background on the labour market behaviour of older men and women.

The historical and contemporaneous facts presented in this section are drawn from a number of different data sources. These are summarized in Appendix A, which includes a brief overview of the databases that are used by researchers in Canada to study retirement behaviour.

Figures 1 and 2 graph the labour force participation (LFP) rates of men and women in different age groups since 1960. The focus is on three age groups: 45-54; 55-64; and 65 plus. For men, there is a decline in the labour force participation of all of these groups. The decline for the youngest group is slight, while the decline for the other groups is much more precipitous. The percentage decline is most dramatic for those age 65 and over, who by the end of the sample period were very rarely participating in the labour force.

FIGURE 1
Historical Trends in LFP of Older Men

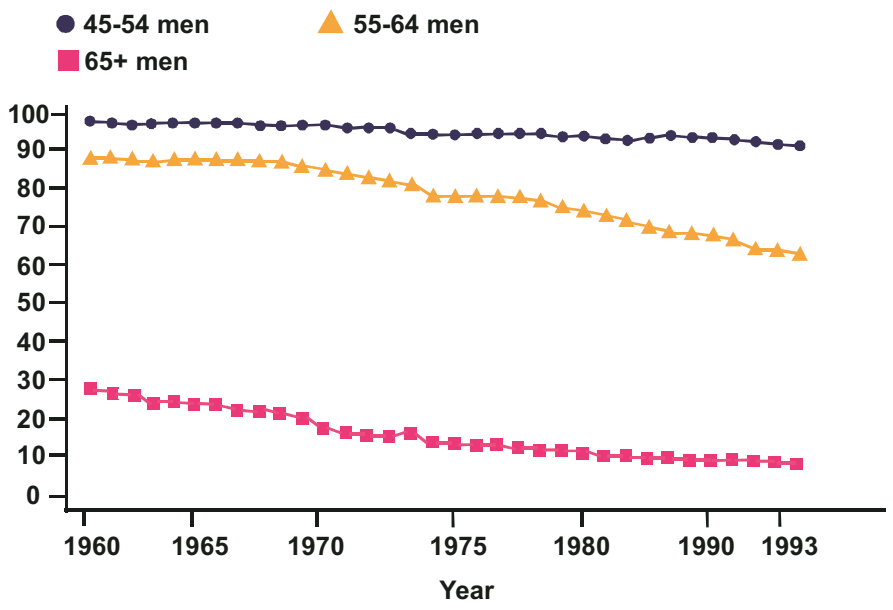
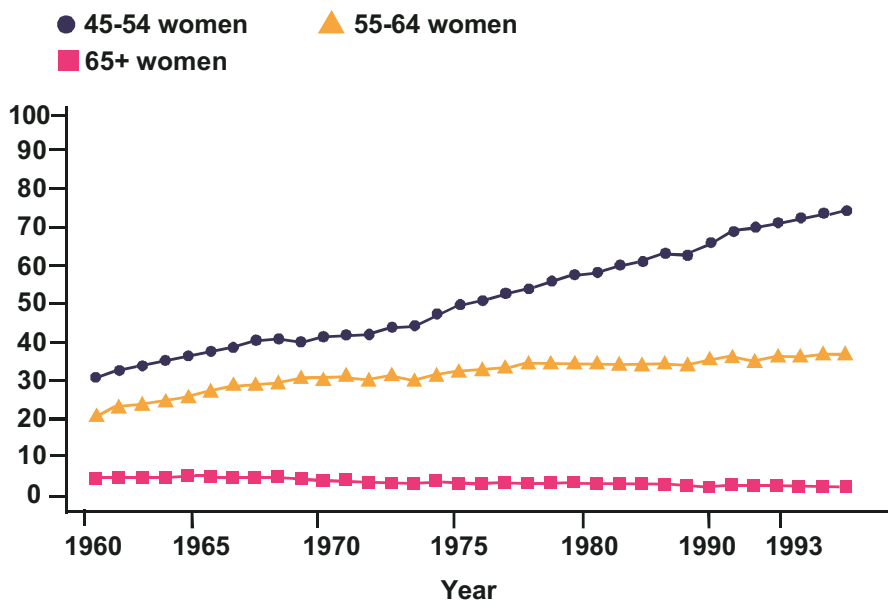


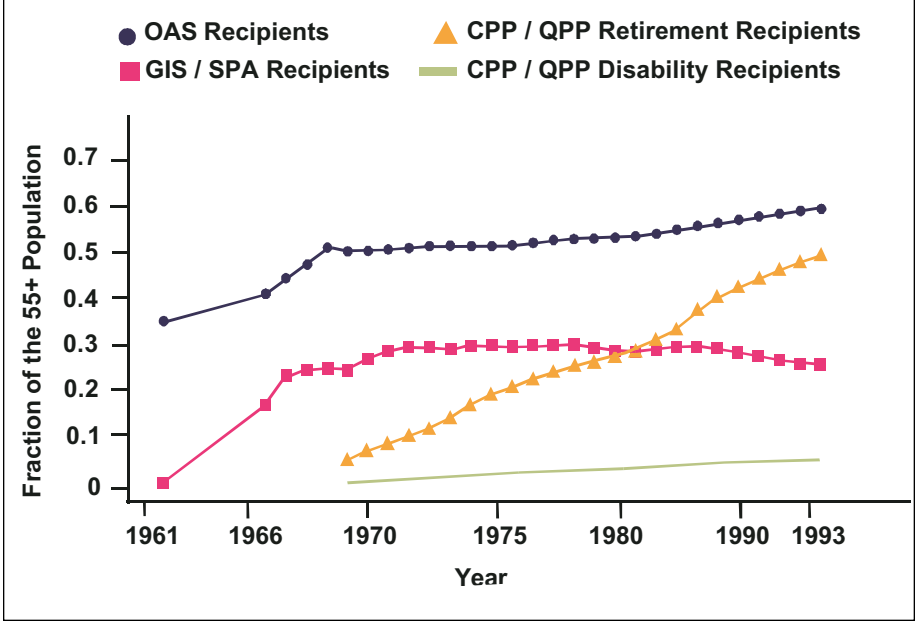
FIGURE 2
Historical Trends in LFP of Older Women



For women, the pattern is quite different: any trend towards earlier retirement is dominated by increased labour force participation. For the two younger groups, participation is rising; for the oldest group, it declines slightly.

One first pass approach to considering whether Social Security (SS) is associated with these labour force trends is to examine related trends in SS generosity. This is done in two ways. First, Figure 3 shows the share of the population over age 55 receiving various sources of retirement income. Four types of income are considered: the Old Age Security System (OAS); the Guaranteed Income Supplement (GIS) or the Spouse's Allowance (SPA); Canada Pension Plan/Quebec Pension Plan (CPP/QPP) retirement benefits; and CPP/QPP disability benefits. In the absence of data on age-specific receipt rates before 1981, total receipt by the age 55 and over population is normalized. This is not a problem for all of the retirement programs which are restricted to those age 60 and above; but this slightly overstates the size of the disability program, since some recipients are under age 55.

FIGURE 3
Receipt of Public Retirement Income



There has been a steady growth in the number of OAS and CPP/QPP disability beneficiaries. There has been a much more rapid growth in CPP/QPP retirement beneficiaries, rising to roughly one-half of the over 55 population by 1993. Perhaps due to the growth in this income source, there was little growth in the GIS/SPA beneficiary population after 1975,

and even a decline after 1985, notwithstanding increases in the maximum amount of GIS/SPA above CPI that were made in the late 1970s and early 1980s.

Figures 4 and 5 explore this time series in more detail, focusing on the period after 1980 for which there is data on receipt rates by age and sex for the CPP only. Each figure has four lines, representing: OAS receipt; GIS/SPA receipt; CPP retirement receipt; and receipt of any of these benefits, including CPP disability. These figures parallel Figure 3: slightly rising OAS recipients (more so for women than for men), more rapidly rising CPP retirement recipients, and a somewhat offsetting decline in GIS/SPA recipients. Of particular interest in these graphs is the jump in CPP retirement recipients in 1987; as discussed below, in this year, early eligibility at age 60 was made available. Overall, there is a steady rise in recipients of benefits from these programs, with a pronounced jump in 1987.

FIGURE 4
Program Receipt for Men

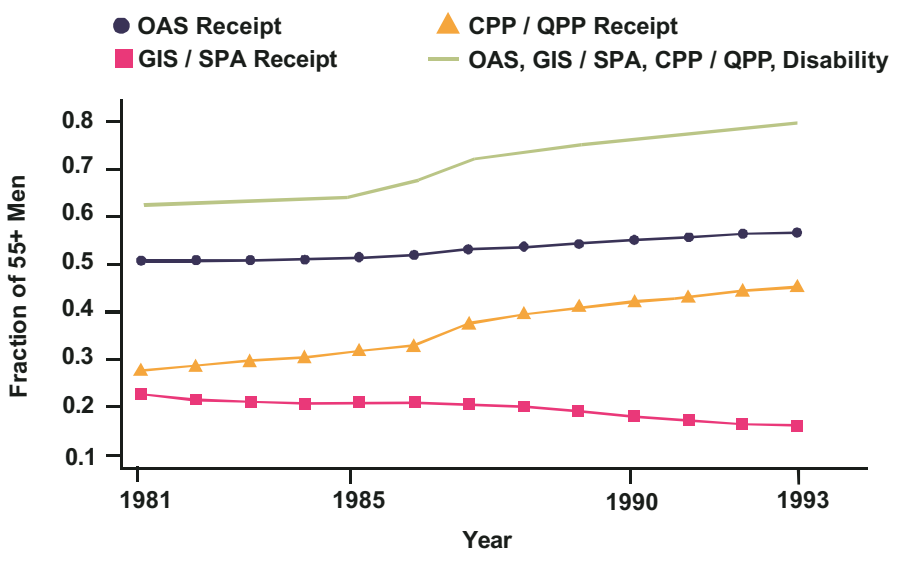
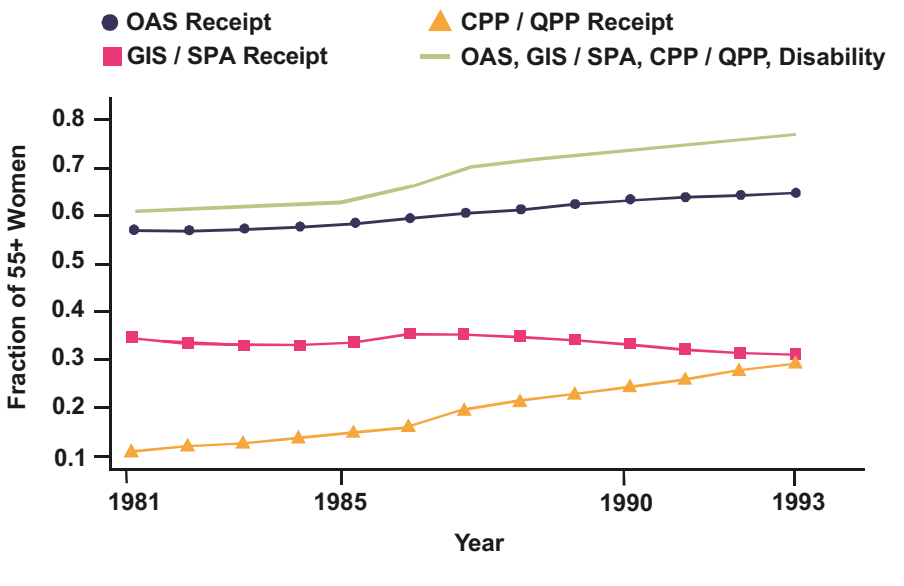


FIGURE 5
Program Receipt for Women

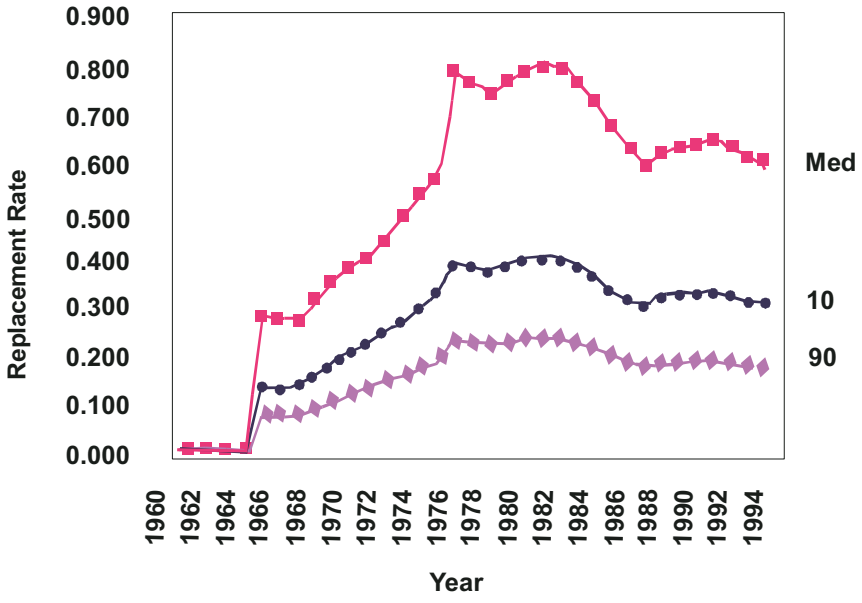


Figures 6a and 6b show the change in generosity of benefits payments over time. The replacement rate is shown through all of these four income support programs from 1960 to 1991 for low earnings (10th percentile), medium earnings, and high earnings (90th percentile) workers. These replacement rates are computed according to the algorithm described in the simulation section below, for a 65 year old man in 1995 with a 62 year old wife.[3] A key consideration in computing replacement rates is the level of other income (i.e. asset income) available to potential retirees, since the GIS and SPA programs are income-tested. As a result, two cases are considered: a couple with no asset income (Figure 6a); and a couple with $4,818 in other income (in 1990 dollars), which is the median level of non-government income in 1990 for families where the head is over age 65 (Figure 6b).

3 The earning from the median, 10th, and 90th percentiles of the earnings distribution of the 1930 cohort are used here and in the simulation model.

FIGURE 6a
Replacement Rates with no Asset Income

FIGURE 6b
Replacement with Asset Income



Replacement rates grow substantially over time. In all cases, they start at zero until 1965, since OAS benefits were restricted to those age 70 and over until that year. Then, in 1966, CPP/QPP benefits were introduced: as described below, this program was phased in over a ten year period. In 1967, the GIS program was introduced as well. As a result of these two features, the replacement rate grew steadily until 1975, reaching roughly 35% in that year for the median earner. In 1975, the SPA program was introduced, leading to a discrete jump in replacement rates due to the fact that the couple in our example has an eligible younger wife. Replacement rates then declined somewhat over time, as the growth rate in earnings exceeded inflation by a substantial amount in the mid-1980s.[4] The replacement rates for the 10th and 90th percentiles follow a similar pattern to the median case, although more pronounced for the 10th percentile.

In Figure 6b, the effect of introducing some asset income is considered. This substantially lowers replacement rates, by reducing the benefits received through the income tested GIS and SPA programs. But the time series pattern is similar to that in Figure 6a.

These time series patterns yield a mixed picture of the influence of SS. There appears to be a strong correlation between the size of the program and the labour force participation rate of older men which has declined steadily in the 1980s and 1990s, even as replacement rates declined.

Labour Market Behaviour in 1993

The April 1992 and 1993 Survey of Consumer Finances (SCF) provides for a more detailed understanding of the time pattern of labour force participation in recent times. The SCF is a large nationally representative survey which asks individuals about their labour force attachment at both the time of the survey and the previous year, as well as about income in the previous year. Two years of the SCF data are averaged for added precision for the estimates of labour force participation by age.

The age pattern of participation for men and women is depicted in Figure 7. At age 45, the participation rate of men is significantly higher than that of women, although almost 80% of 45 year old women are working. There is then a gradual parallel decline for men and women until age 55, at which times the pace steepens. This is particularly true for men, so that the participation gap closes substantially by age 65. By age 70, participation has dropped quite low, with fewer than 10% of men or women participating in the labour force.

4 Moreover, the earnings of the sample family head are tied to the earnings base for CPP contribution rate calculations, which grew especially fast in the mid-1980s.

FIGURE 7
Participation Rates by Age and Sex, (Average, 1992, 1993)

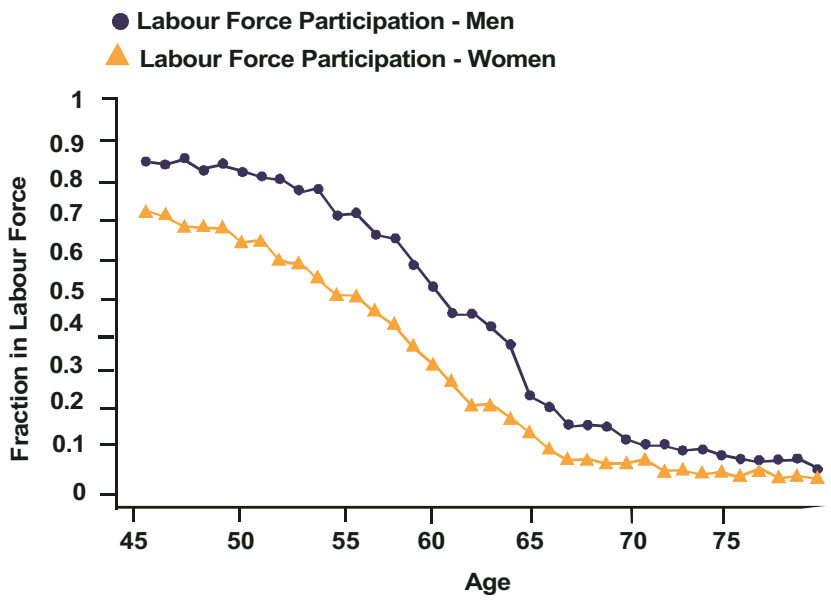


Figure 8 considers in more detail the allocation of time among men as they age, by dividing activities at each age into employment, unemployment, disability, and retirement. There is a steady decline in employment of men as they get older. Most of this decline is reflected in an increase in retirement, and in an increase in disability after age 55; unemployment rates are fairly constant until age 60. After age 60, the proportion of men employed falls more rapidly, and the proportion of men unemployed falls as well; the proportion of men who are disabled begins to fall after age 65. These declines are reflected in rapid increases in retirement. This same exercise is repeated for women in Figure 9. The patterns are similar, with the exception that a much larger share of women are not pursuing any of these activities (they are out of the labour force for other reasons).

FIGURE 8
Distribution of Activities of Men by Age

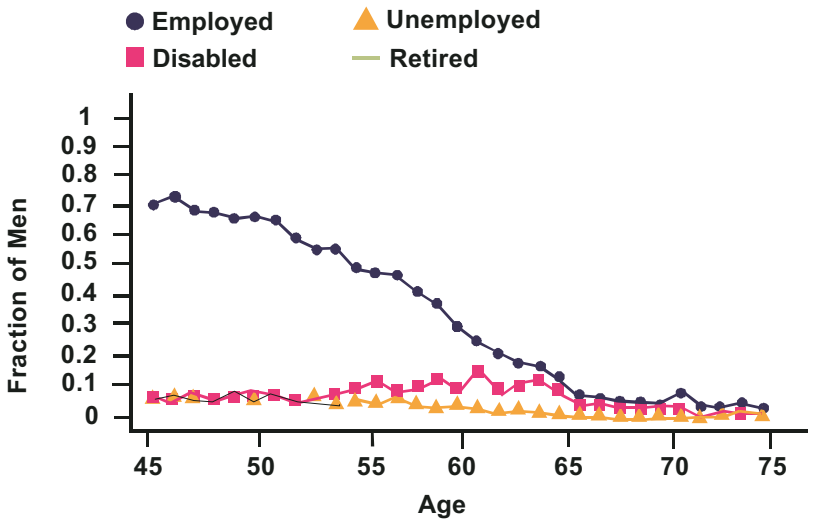
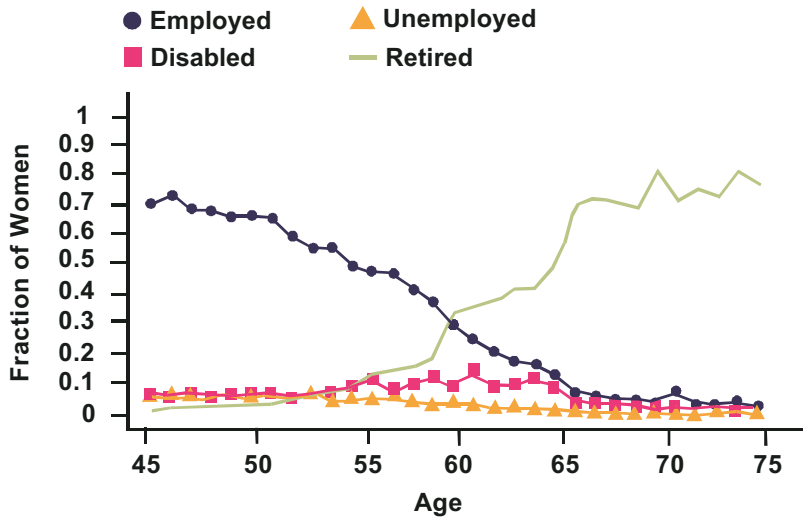


FIGURE 9
Distribution of Activities of Women by Age



Income Sources of Older Persons

Figures 10 and 11 examine the incidence of receipt of public and private retirement income for older persons using SCF data in 1992. Figure 10 graphs two series for men only: the rate of Social Security recipiency (of OAS, CPP/QPP, and GIS/SPA); and the rate of recipiency of other public assistance (non-retirement income assistance) through the unemployment insurance and provincial social assistance (means-tested welfare) programs. This figure highlights the fact that even before retirement, a large share of men are receiving public assistance. As a result, the dramatic increase in retirement income receipt after age 60 is to some extent offsetting other government transfer payments. By age 65, there are only minimal receipts of other transfers (some provincial GIS top-ups, public assistance to those who do not qualify for OAS, e.g., recent immigrants), and most men are receiving some form of retirement income.

FIGURE 10
Public Income Recipiency for Men

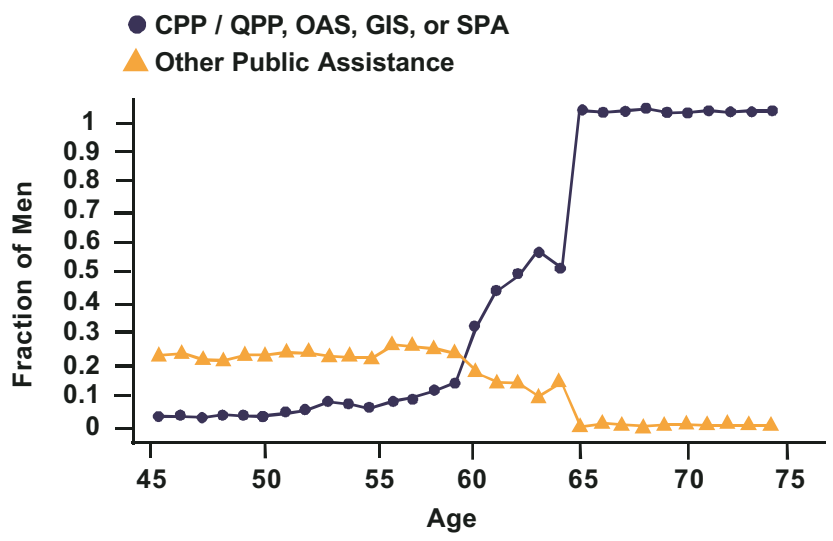
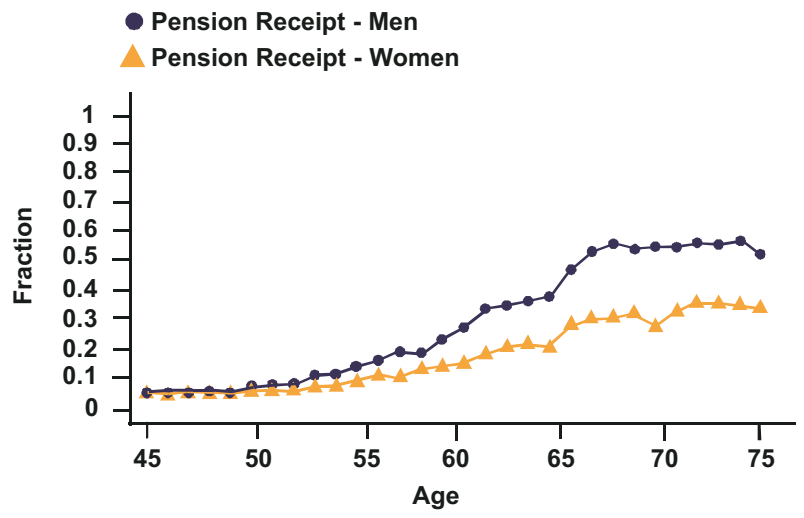


Figure 11 displays the percentage of men and women at each age who are receiving private pension income. This grows fairly rapidly from age 55 on, particularly for men, so that by age 67 more than one half of the male population is receiving pension income. Pension receipt for women at older ages is only about two-thirds as common. At the same time, however, many women will be benefiting indirectly from these income streams through their husband's pension.

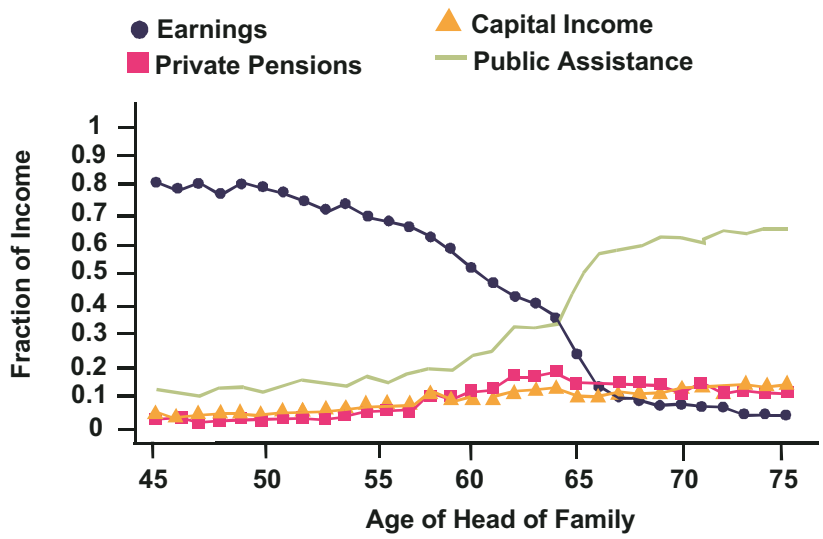
FIGURE 11
Private Pension Receipt by Sex



Finally, Figure 12 shows the distribution of income sources for couples, arrayed by the age of the head of the family.[5] Considered is the distribution of income across four sources: earnings, capital income, private pensions, and public sector income (predominantly retirement income for older couples, as shown in Figure 10). Earnings are the dominant source of family income until age 55, at which point the earnings share begins to decline rapidly; even from age 45-55, however, public assistance plays a non-trivial role (mirroring the results in Figure 10). The decline in earnings after age 55 is compensated for by increases in each of the other elements, most importantly public income. By age 70, social security income in the form of CPP/QPP and OAS/GIS, accounts for over 70% of family income.

5 This differs somewhat from previous figures, where the unit of observation is the older person. The data source is SCF.

FIGURE 12
Distribution of Family Income by Source



2. Key Features of the Income Security System

The Old Age Security System

The oldest component of the income security system for older Canadians is the OAS System, which was put into place in 1952, replacing a provincially run income tested benefits system that had existed since 1927. This program is available to anyone age 65 year or over who meets certain residence requirements.[6] The program originally provided benefits to those age 70 or over, and the age of eligibility was dropped to 65 over a five year period beginning in 1966.

The OAS pension itself is a uniform demogrant which was equal to $413.70 in July 1999. Individuals who do not fully meet residence requirements may be entitled to a partial OAS benefit. OAS benefits have been indexed to the Consumer Price Index (CPI) since 1972. OAS benefits are fully taxable. In addition, there is a clawback of OAS benefits from very high income individuals; the OAS for an individual is reduced by 15 cents per dollar of personal net income exceeding $53,215. The OAS basic benefit and its component GIS/SPA benefits are financed from general taxation revenues.

The Canada/Quebec Pension Plan

The largest component of the income security system is the Canada Pension Plan (CPP) and Quebec Pension Plan (QPP). These programs began on January 1, 1966, and are administered separately by Québec for the QPP, and the federal government for the CPP.

The plan is financed by a payroll tax of 3.5% (1999) each on both employers and employees. This payroll tax is levied on earnings between the Year's Basic Exemption ($3,500) up to the Year's Maximum Pensionable Earnings (YMPE), $37,400 in 1999 (which approximates median annual earnings). The YMPE is indexed to the growth in average wages in Canada.

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6 Individuals must have been Canadian citizen or legal residents of Canada at some point before application, and have resided in Canada for at least 10 years (if currently in Canada) or 20 years (if currently outside Canada). The benefit is prorated for pensioners with less than 40 years of Canadian residence, unless they are "grandfathered" under rules that apply to the persons who were over age 25 and had established attachment to Canada prior to July 1977.

Eligibility for this plan is conditioned on contributions in at least one calendar year during the contributory period, which is the period from attainment of age 18, or January 1, 1966 if later and normally extended to age 70 or commencement of the retirement pension, whichever is earlier. Benefits are then computed in several steps.

First, the number of months used to compute the retirement pension is computed by subtracting from the number of months in the contributory period, months (a) receiving a disability pension, (b) spent rearing small children,[7] (c) between age 65 and the commencement of the pension,[8] and (d) 15% of the remaining months. The last three of these conditions is subject to the provision that it not reduce the contributory period below 120 months after taking into account the allowable offset for months of disability pension receipt. In addition, excess earnings in one month above 1/12 of the YMPE may be applied to months in the same year where earnings are below 1/12 of the YMPE.

Second, the remaining months of earnings history are converted to current dollars, using the following adjustment factor — the ratio of the YMPE in each year to the average of the YMPE over the three years until 1998 prior to (and including) the year of pension receipt. This is four years for benefits claimed in 1998 and five years for benefits beginning in 1999. **Finally,** the benefit is computed as 25% of the average of this real earnings history. This 25% ratio has been in place since 1976; from 1967-1976, the program was phased in, with the share of average earnings paid out in benefits rising from 2.5% in 1967 to 25% in 1976. In addition, from 1974 when the 2% annual growth ceiling was removed and until the YMPE reached the average industrial wage in 1986, it was rising more rapidly than average wages (12.5 percent per year).

Until 1984 for the QPP and 1987 for the CPP, benefits could not be claimed before the 65th birthday, and there was no actuarial adjustment for delayed claiming. Beginning at these times, individuals were allowed to claim benefits as early as age 60, with an actuarial reduction of 0.5% for each month of early claiming (before age 65), and an actuarial increase of 0.5% for each month of delayed claiming (after age 65, and up to the age of 70).

Since this early retirement provision has been in place, about half the new CPP recipients each year have claimed a retirement benefit before the age of 65. Because receiving a CPP retirement pension before age 65 means

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7 This is defined as months where there was a child less than 7 years of age and the worker had zero or below average annual earnings.

8 Periods after age 65 to age 70 can be substituted for periods prior to age 65 if this will increase their future retirement pension.

that the pension is actuarially reduced, this means that the income of the person retiring at the age of 60 could be lower than that of the person who retired at the age of 65. The Office of the Superintendent of Financial Institutions (OSFI) estimated that after 1991, a CPP pension for someone retiring before the age of 65 was, on average, 82% of what it would have been had they not opted for early retirement.[9]

Until 1975, receipt of benefits between ages 65 and 70 under the CPP and QPP was conditioned on low earnings levels, with earnings above these ceilings taxed away at high rates. In 1975, these earnings tests were eliminated. With the introduction of early retirement under QPP and CPP in 1984 and 1987, respectively, workers can only claim early benefits if their annual rate of earnings at that point does not exceed the maximum age 65 retirement pension payable for the year in which the pension is claimed. This earnings test is only applied at the point of application, however; after that point, there is no additional check on the individual's earnings.[10] Moreover, the earnings test does not apply once the individual reaches age 65.

CPP/QPP benefits are based on an individual's earnings history, and the retirement benefits of one spouse are not linked to that of the other spouse.[11] But there is an interdependence through survivor benefits (as well as the interdependencies through the income-tested programs described below). Spouses are eligible for survivor pensions if the deceased contributor made contributions for the lesser of 10 years or one third of the number of years in the contributory period, and if the spouse is over age 45 or is disabled or has dependent children. For non-disabled spouses with children, the CPP benefit is pro-rated downward by age between 45 and 35.[12] For spouses under age 65, the survivor pension is a combination of a flat rate portion plus 37.5% of the earnings-related pension of the deceased spouse. For spouses age 65 and above, the survivor's pension is equal to 60% of the earnings-related pension. The pension used to calculate the survivor's benefit is not subject to actuarial adjustment. If the surviving spouse is receiving his or her own CPP disability or retirement pension then the combination of the earnings-related portion of the two pensions cannot exceed the maximum retirement pension available in the year. Under changes made effective in 1998, the two benefits do not stack up to this ceiling; rather the contributor

9 Special calculation for the 1992 Old Age Security Program Evaluation by OSFI.

10 There are no restrictions on returning to work after the benefit is being paid.

11 Couples do have the option of sharing their benefits for income tax purposes, since taxation is at the individual level. Each spouse can claim up to half of the couple's total CPP/QPP pension credits. The exact calculation depends on the ratio of their cohabitation period to their joint contributory period.

12 QPP rules for younger surviving spouses differ from those of the CPP.

receives the larger of the two earnings-related portions plus 60% of the smaller. As well, if under the age of 65, the survivor receives the flat rate portion of the survivor benefit or, if a disability pensioner, the (larger) disability flat-rate benefit only.

Children of deceased contributors are also entitled to a CPP survivor's benefit if under 18 or a full time student between 18 and 25; this benefit is a flat amount. The corresponding QPP benefit ends at age of 18. There is also a lump sum death benefit, which is generally equal to one-half of the annual CPP/QPP pension amount up to a maximum ($3,500 in 1997).[13]

Since 1973 benefits have been legislated to increase annually with the CPI: this annual indexation factor is the ratio of the CPI average over the 12 month period ending with October of the preceding year to the average of the prior 12 month period. Benefits are fully taxable by the federal and provincial governments.

Another notable CPP change was that the maximum CPP disability benefit was increased by 30% per month in 1987. Earlier disability coverage was also extended to new entrants. As well, persons receiving survivor benefits no longer had their benefits discontinued on remarriage.

The Guaranteed Income Supplement and Spouse's Allowance

GIS is an income-tested supplement available to recipients of OAS which was introduced in 1967. Individuals must re-apply for the GIS each year, and the income test for eligibility (and benefit) levels is repeated. The definition of income for the purpose of income-testing is the same as for income tax purposes, with the important exclusion of OAS pension income. Unlike the OAS clawback or CPP/QPP, GIS benefits are based on family income levels.

There are separate single and married guarantee levels for the GIS; in 1999 (July to September), these were $491.65 for singles and $320.24 (per person) monthly for married. Benefits are then reduced as other income rises by 50%.

The SPA, which was introduced in 1975, is an income-tested monthly benefit available to 60-64 year old spouses of OAS recipients and to 60-64 year old widows/widowers. For the spouse of an OAS recipient, the benefit is equal to the OAS benefit plus GIS at the married age; the OAS portion is reduced by 75% of other income until it is reduced to zero, and

13 Under the 1997 legislation, this maximum is fixed at $2,500 for all years after 1997, and in the case of the QPP all death benefits are set at this level.

then the combined GIS benefits of both spouses are reduced at 50%, as other income rises. For a widowed spouse, the benefit is equal to the OAS plus GIS at the widowed rate, and is "taxed-back" equivalently. Both the GIS and SPA guarantees are also indexed to inflation, and neither source of income is taxable by either the federal or provincial governments.

Labour Force Withdrawal Rates

One natural question is whether the labour force behaviour of older Canadians lines up with the incentives inherent in the systems described above. This question is explored in Figures 13 and 14, which show exit rates out of the labour force (LF) for men and women, respectively. This is measured as the change in the proportion of the labour force leaving at any age, relative to the stock of workers participating in the labour force at that age. For men, there is clear evidence of a dramatic increase in labour force leaving at age 65, which is the age of normal retirement for CPP/QPP, and of entitlement to OAS benefits. Fully 40% of the men who remain in the labour force at age 65 leave during that year. There is also evidence of a response to the CPP/QPP early retirement age of 60, but it is not particularly strong relative to the exit rates in surrounding years. This is consistent with the notion that the response to early retirement entitlements emerges only slowly, as documented by Burtless and Moffitt (1984) for the U.S. For women, the pattern is similar: a pronounced spike at age 65, with some evidence of a response around age 60 but nothing particularly pronounced.

FIGURE 13
Exit Rate out of LF for Men

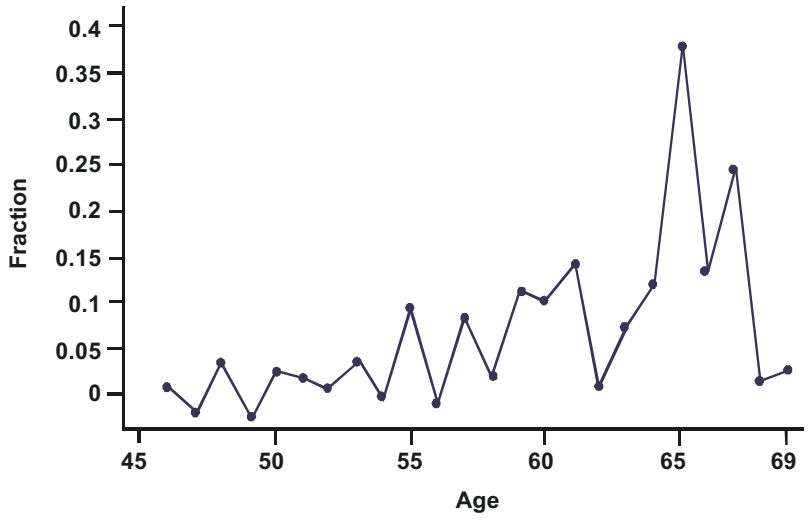
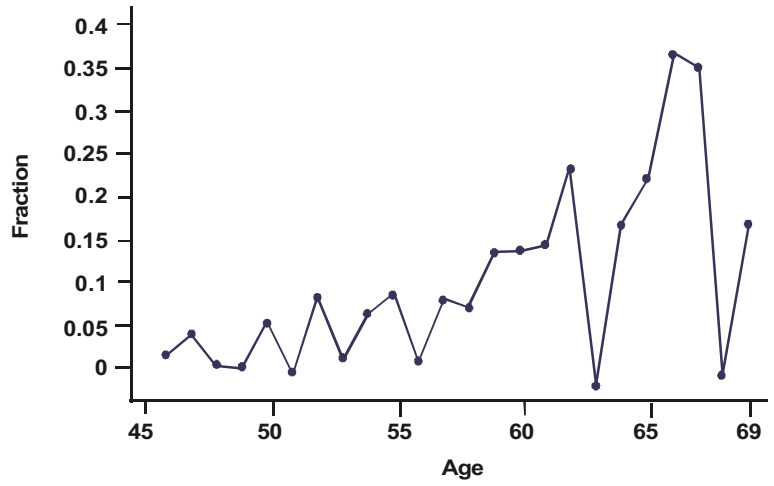


FIGURE 14
Exit Rate out of LF for Women



Other Public Programs

In addition to the federal retirement programs, there are a variety of provincial programs that provide supplements to low income retirees. For example, the GAINS-A program in Ontario provides $80/month to Ontario residents who are recipients of the GIS; these benefits are taxed back at 50% as other (non-OAS or GIS) income rises.

A final program that is important for considering retirement incentives is the disability benefit program that is operated through the CPP/QPP. This program provides benefits to those workers unable to work due to disability. The basic benefits structure consists of two portions: a flat-rate portion, which is a lump sum paid to all disabled workers; and an earnings-related portion, which is 75% of the applicable CPP/QPP retirement pension, calculated with the contributory period ending at the date of disability. This program is fairly stringently screened, and fewer than 5% of older Canadian men are on CPP/ QPP disability.

Private Pension Coverage

Another important feature of the retirement landscape is private pensions. Defined benefit pension plans share many of the same incentive features as public insurance plans. In 1992, 47.5% of paid workers were covered by occupational pensions, with coverage being slightly higher for males than for females. About 90% of plan members were in defined benefit plans, although the share in defined contribution plans has been growing

recently. Defined contribution plans may also affect retirement through income effects, but there should not be tax/subsidy effects on the work decision since the payout is not dependent on work patterns.

The Retirement Effects of Income Support Programs in Canada

While there is a large U.S. literature on Social Security and retirement (see Diamond and Gruber (1997) for a review), there is much less work in the Canadian context. Recently, Baker and Benjamin (1996) have explored the effects of the introduction of the early retirement option under the QPP in 1984 and the CPP in 1987. They found that there was little effect of this policy change on the labour force behaviour of 60-64 year old in the short run. But there is some suggestion of a longer run response, as a small "spike" in labour force leaving has emerged at age 60 in recent years (as shown in Figure 13). Baker and Benjamin (1997) explore another important policy change, the removal of earnings tests under the CPP and QPP in the 1970s. They find that the removal of earnings testing was associated with a significant shift from part-time to full-time work among older workers.

3. Retirement Incentives

Simulation Modelling

In this section, a model of benefits determination under these four programs (OAS, GIS, SPA, CPP) is used to assess the incentives of Social Security (SS) through accrual rate effects on decisions as to when to retire. Given the similarities of the CPP and QPP programs, the incentives are calculated for a CPP contributor. This model includes the benefits computation and clawback structure of these four programs to compute benefits for a worker, given a set of assumptions about his age, spouse's age, earnings history, and date of retirement. The base case assumptions of the CPP are used for wage and price growth, as well as assumptions on the growth of the program contribution rate, to model incentives.[14] The program computes benefits for the worker and survivor and death benefits for the case where the worker has died. The maximum CPP contributions would occur in the last year of work since it is assumed that earnings are constant in real terms after age 50, which means that they only grow in nominal terms.

In this section, a model of benefits determination under these four programs is used to assess the incentives of Social Security (SS) on decisions as to when to retire through accrual rate effects, under certain restricted assumptions.

The next step in the simulation is to take these monthly benefit entitlements and compute an expected net present discounted value of Social Security Wealth (SSW); this includes the future entitlements from all the sources of retirement income comprising OAS, GIS, SPA, and CPP. This requires projecting benefits out until workers reach age 100, and then taking a weighted sum which discounts future benefits by both the individual discount rate, and the prospects that the worker will live to a given future age. The methodology for doing so is described in Diamond and Gruber (1996). For the retirement benefit, this is fairly straightforward; it is simply a sum of future benefits, discounted backwards by time preference rates and mortality rates. For survivor benefits, it is more complicated, since the joint likelihood of survival of the worker and the dependent must be accounted for. A real discount rate of 3% is used. To adjust for mortality prospects, the sex/age specific Canadian life tables from Statistics Canada are used.[15] Finally, to compute the net present value of the SSW, the CPP payroll tax payments that the individual would make during any continued (future) work are deducted. Both the employee and employer shares of the payroll tax are added, under

For the output of the simulations, three different concepts are calculated. The first is the net of tax replacement rate, the rate at which SS replaces the (after tax) earnings of the worker should he continue working in that year... second concept is the accrual rate, the percentage change in SSW from the previous year...an implicit tax/subsidy rate is computed, which is the absolute change in SSW over the potential earnings from working that year.

14 The base case assumptions for the CPP are those of the Office of the Superintendent of Financial Institutions Fifteenth Actuarial Report, for wage and price growth, and the schedule of CPP contribution rate increases before the 1997 amendments to CPP.

15 See Life Tables, Canada and the Provinces, Health Report Supplement No. 13, 1990, Volume 2, Number 4, pages 16-19, Canadian Centre for Health Information, Statistics Canada.

the assumption that the employer share if fully borne by the worker would be in the form of lower wages. All figures are discounted back to age 55 by both time preference rates and mortality risk.

For the output of the simulations, three different concepts are calculated. The first is the net of tax replacement rate, the rate at which Social Security (SS) replaces the (after tax) earnings of the worker should he continue working in that year. It is important to do this calculation on an after-tax basis, to account for the facts that (a) GIS, and SPA benefits are not taxable, and (b) even for taxable OAS and CPP benefits, the individual may be in a lower tax bracket when retired. Modelling the average tax rate faced by earners of different earnings level in each year is done assuming that the tax system stays constant into the future (with the same rate structure and indexed tax brackets).

The second concept is the accrual rate, the percentage change in SSW from the previous year.

Finally, an implicit tax/subsidy rate is computed, which is the absolute change in SSW over the potential earnings from working that year. This represents the implicit tax on, or subsidy to continue work, in terms of the net change in SSW that is implied by that additional year of work. This is the relevant concept for the worker who is trading off leisure (on receipt of SS) against continued work.

In computing these concepts, the unconditional mortality risk beyond age 55 is used; that is, there is some probability that the worker may be dead at each year after his 55th birthday. An alternative approach would have been to use conditional life tables at each year. The correct approach here depends on the perspective taken. The approach used is appropriate if the computation is taken from the perspective of the forward looking 54 year old, who is considering the retirement incentives at all future ages. The alternative would be appropriate for year-by-year decision making on retirement. Since the dollar figures are discounted back to age 55 by both time preference and mortality risk, both concepts yield the same tax/subsidy effects (since both numerator and denominator are deflated); however, they will yield somewhat different values of SSW and therefore different accrual rates.

To produce the base case numbers, an individual is used who was born in January 1930, and thus turned 65 in January 1995 and who had a continuous earnings history. In theory, to calculate benefits for a worker, his/her entire earnings history since 1966 would be required. In practice, a "synthetic" earnings history is employed which uses the median earnings of a cohort through time. As a first step in creating this synthetic earnings history, information is computed on the median earnings by calendar year

and age cohort from the 1973-1993 SCF data.[16] More specifically, the median earnings are taken for a 62 year old in 1992, for a 61 year old in 1991, and so on back through the survey years. To estimate from 1973 to 1966, before cross-sectional survey data was available, first an estimate of cross-sectional age-earnings profiles in the 1973 survey is made. Then these estimates are applied to "un-age"[17] the workers in the 1973 survey back to 1966, and deflate these pre-1973 profiles by average wage growth in the region of Ontario, using data from Gruber and Hanratty (1995). To project earnings beyond 1992, the growth in the YMPE (actual to 1995, projected thereafter) is used.

In pursuing this calculation, a relatively steep decline in median earnings after about age 50 is found, which presumably reflects the fact that more and more of the earning population is working only part-time. However, the synthetic individual is considering the decision to work full-time for an additional year, so this modifies somewhat the true nature of the underlying earnings history. As a result, this synthetic earnings profile through age 50 is used, and then it is assumed that earnings stay constant in real terms from age 51 onwards.

For the purposes of the simulations below, it is assumed that workers claim Social Security (SS) benefits at the point of their retirement, or when they become eligible if they retire before the point of eligibility. It is assumed initially that the worker's wife is exactly three years younger than he is. It is also assumed that she has never worked. An important simplifying assumption is that the worker has an uninterrupted work history at the median wage level, and therefore is entitled to a maximum CPP retirement pension at the earliest possible age. It is recognized that this is probably not a typical case. Finally, a critical parameter is the level of outside (i.e. asset) income available to the worker, since the GIS and SPA benefits are means tested. Following the computation of replacement rates above, two cases are considered: zero outside income and outside income of $4,818.

Base Case Results

Table 1 shows the base case results, with zero asset income for the medium wage worker born in 1930 and with a wife born in 1933 who was

16 These data are collected annually at the individual level from 1981 onwards. Before then, they were collected biannually at the family level. The information for male heads of household is used.

17 To un-age means to use age profiles estimated through cross-section data to obtain earnings profiles back through time.

never in the paid labour force. The worker never had to avail himself of the drop-out privilege for calculating CPP retirement pension benefits.[18]

This analysis is first provided for the individual worker for a long career with likely a single employer. This illustrates the potential impact of pension wealth accrual on the retirement decision in this special case of no or low income "drop-out", which is much less typical of the 1930 cohort.[19] This is to draw a comparison with the pension wealth accrual effect in the more typical circumstance for workers born in 1930 who would have availed themselves of some or all of the CPP "drop-out" for low or no earnings years. This more typical case is discussed later in this section of the paper.

Each row represents the age of the worker in the last year that they work; that is, the first row represents the effect of working during the 54th year and retiring on the 55th birthday (January 1, 1985). The first column shows the net replacement rate. This concept is not defined until the worker can actually claim benefits, which occurs if his last year of work is at age 59 so that he retires at 60.

At that first point of possible claiming of a CPP retirement benefit the replacement rate is roughly 18%. The replacement rate then rises slowly to age 65, as workers increase their Social Security (SS) benefits by delaying claiming a CPP retirement benefit. At the end of the 64th year (or age of 65, on January 1, 1995), there is a large discrete jump, as the OAS benefit begins, and then a continued slow rise from actuarial adjustment.[20] Then, at the end of the 67th year (or at age 68, on January 1, 1998) there is another discrete jump from the commencement of the wife's OAS

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18 This refers to the possibility of dropping out low or no earnings years up to a maximum of 15% of working years between the ages of 18 and 65 in the calculation of CPP pension benefits (after the onset of 1966 when the CPP began). Maximum CPP pension benefits would have been earned by the base case individual who would have worked continuously between the beginning of the CPP program in 1966 and whenever he chose to retire.

19 This base case illustrative worker/CPP contributor who would not gain by utilizing the "drop-out" to maximize CPP pension wealth, would represent 10 to 16% of all males born in 1930, and even a lower proportion of females (1 to 5%) born in the same year. This was the finding from estimations of what proportion of men (84 to 90%) would have lost in terms of CPP retirement pension wealth accrual at age 65 from a reduction in the general CPP "drop-out" for low or no earnings from 15% to 10%. The preponderance of men and women born in 1930 would have benefited by taking the maximum general "drop-out" allowed. This estimate was obtained through simulations with the recently developed "DYNACAN" CPP Policy Model of Social Policy Branch, HRDC. Real Record of Earnings for CPP contributors born in 1930 were used to validate the DYNACAN income streams; the number of observations in the DYNACAN sample of working men and women born in 1930 were 143 and 133, respectively. Other DYCANAN simulations revealed that the use of the general "drop-out" would have been even more beneficial to later generations.

20 This relates to the Table 1 data where we are comparing the rows "Age 64" and "Age 63". The net replacement rate jumps from 0.2806 to 0.6037 from the end of the 63rd year of life

benefit, and a continued rise from actuarial adjustment. Thus, for the worker who works through his 69th year and collects on his 70th birthday, SS replaces roughly all of his after-tax earnings.

TABLE 1
Base Case Incentive Calculations, No Outside Income, No Low or Absent Earnings "Drop-Out" Years for CPP

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	—	148,138	0	0	0
55	—	149,053	916	0.0062	-0.0415
56	—	148,944	-109	-0.0007	0.0051
57	—	148,188	-756	-0.0051	0.0355
58	—	147,437	-751	-0.0051	0.0365
59	0.1760	146,685	-753	-0.0051	0.0380
60	**0.1964**	**145,232**	**-1453**	**-0.0099**	**0.0771**
61	0.2116	143,667	-1565	-0.0108	0.0848
62	0.2520	142,162	-1505	-0.0105	0.0848
63	0.2806	140,528	-1634	-0.0115	0.0962
64	0.6037	137,502	-3025	-0.0215	0.1859
65	0.6124	131,793	-5709	-0.0415	0.3672
66	0.6212	125,678	-6115	-0.0464	0.4128
67	0.9285	120,112	-5565	-0.0443	0.3955
68	0.9545	115,755	-4357	-0.0363	0.3269
69	0.9838	111,473	-4282	-0.0370	0.3403

The next three columns show the evolution of SSW over time. For understanding these results, it is useful to recap the five mechanisms through which additional work affects the computation of SSW.

1. The worker must pay SS taxes on his earnings,[21] lowering net SSW.

2. The additional year of earnings is used in the recomputation of SS benefits, replacing a previous low (or zero) earnings year (besides the 15% of lowest months that have already been excluded). Additional work raises net SSW through this channel. But this is only true if these additional years of earnings are above the YMPE, and some earlier

[21] This refers to both the employer's and employee's equal share of the total contribution rate. The implicit assumption is that the employee pays both his/her share and the employer's share, and that the employer's share is part of the real wage bill.

years of earnings were below. For this analysis it is assumed in fact, that all years of earnings are above the YMPE.

3. The additional year of work, for work at ages 60 and beyond, implies a delay in claiming. This raises future benefits through the actuarial adjustment, but it implies fewer years over which benefits can be claimed. As a result, there is an ambiguous effect on net SSW.

4. The additional year of work will lower GIS and SPA benefits through means testing, both of the income from work and of the higher CPP benefit which results from additional work.

5. For each year into the future we consider, there is some chance that the worker will die, lowering his net SSW.

As Table 1 shows, the base case worker who retires on his 55th birthday has accumulated $148,138 in SSW. There is then a small increase in SSW for work during the 55th year (after the 55th birthday on January 1, 1985). This is because the worker still has not completed his earnings history for full benefit eligibility, so that additional years of work therefore replace a zero (a year with no earnings) in the benefits computation. Similarly, the system is neutral with respect to work during the 56th year, since there is roughly (in our example) six months of work in that year required to fully complete the earnings history.[22] After this point, additional earnings do not affect the full benefit eligibility, as noted above, since for the base case, earnings in every year are above the YMPE. From age 57 onwards, therefore, the SSW uniformly declines, so that the system is placing a net tax on work. As a result, the accrual rate is negative in all years except the first. For this analysis, it is assumed in fact that all years of earnings are above YMPE.

The final column shows the tax/subsidy rate.[23] There is a slight subsidy to work of 4.2% in the 55th year, as noted above, and then taxes on work thereafter. This tax is lower than the payroll tax which finances the CPP through age 60, since earnings below the YBE and earnings above the YMPE are exempted from tax. But there is no other form of tax/benefit linkage in this range, since there is no benefit recomputation for additional work for a worker whose earnings each year were above the YMPE.

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22 This is an approximation of the proportion of the year that must be worked in order to complete the earnings history and not to have zeros included in the earnings average, so that you drop out the lowest or no earnings months from the calculation.

23 Implicit tax effects in Tables 1-6 are depicted as positive effects and subsidies as negative effects.

Beginning in the 60th year, tax rates on continued work rise more rapidly. There is actually an increase in the underlying value of the man's CPP wealth over the range of work in the 60th through 63rd year. But this is overshadowed by the scheduled rise in the CPP contribution rate, and the reduction in GIS/SPA benefits.

Beginning with work during the 64th year, the tax rates rise substantially, as the adjustment becomes insufficient to compensate for delayed claiming of benefits.[24] In addition, beginning in the 65th year, there is a much larger tax rate through the GIS/SPA program. This is due to the fact that the GIS benefit kicks in once the worker is aged 65 and is receiving the OAS. The tax rate then declines again beginning with work during the 67th year. This is because the wife is turning 65, so that she is moving out of the range of eligibility for the (income-tested) SPA benefit although now in the GIS tax-back range. As a result, there is less of a disincentive for earnings for the husband.

Table 2 presents analogous results for the case with outside income ($4,818 per year). In this case, the pattern of tax rates is quite similar through age 60. From age 60 onwards, however, the tax rates on continued work are somewhat lower, with tax rates peaking at 32% (instead of the 41% tax rate with zero asset income). This pattern is a reflection of the implicit tax on work put in place by the GIS and SPA programs. With more outside income, these programs are irrelevant. As a result, raising CPP benefits through working to an older age is relatively more attractive, since doing so does not reduce the income-tested GIS/SPA entitlement. Thus, the net effect of the Canadian retirement income system on work incentives is fairly sensitive to whether or not the family is in the range where income-tested benefits are relevant.

Table 3 explores these same results for a single male worker, for the case with outside income ($4,818 per year). The other basic assumptions are retained. Until age 60, the pattern of incentives for this single worker is very similar to that of the married worker. There is a slight implicit subsidy effect (1%) at ages 62 and 63. Otherwise, from age 60 onwards, the tax rates are generally lower for the single worker than for the married worker base case. This reflects the fact that there is no implicit taxation through the SPA program in this case, since there is no spouse who can benefit from that program. Neither is there much GIS benefit after 65 because of the outside income. If there is no outside income for this single worker,

24 The relatively large jump at age 64 is due to the particulars of this example. There is a much larger rise in the CPI from 1992 (when the worker is age 62) to 1993 (age 63) than from 1993 to 1994 (age 64). As a result, the increase in pension benefits is unusually large from age 62 to 63, and unusually small from 63 to 64. Thus, there is little change in the tax rate on continued work from age 62 to 63, and a large change from 63 to 64; in other years, the change from 62 to 64 would have been spread across both years.

however, there are non-trivial taxes after age 65 (averaging 18%), reflecting the clawback of GIS benefits.

The implicit tax subsidy to continued work varies in the population for a number of reasons, such as marital status, life expectancy and earnings.

TABLE 2
Base Case Incentive Calculations, Outside Income ($4,818 per year), No Low or Absent Earnings "Drop-Out" Years for CPP

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	—	124,391	0	0	0
55	—	125,406	1015	0.0082	-0.0488
56	—	125,336	-70	-0.0006	0.0034
57	—	124,580	-756	-0.0060	0.0374
58	—	123,829	-751	-0.0060	0.0383
59	0.1817	123,076	-753	-0.0061	0.0397
60	**0.2017**	**121,938**	**-1138**	**-0.0092**	**0.0629**
61	0.2165	120,759	-1179	-0.0097	0.0662
62	0.2449	119,668	-1091	-0.0090	0.0636
63	0.2695	118,501	-1167	-0.0097	0.0709
64	0.5078	115,824	-2677	-0.0226	0.1694
65	0.5182	111,513	-4311	-0.0372	0.2849
66	0.5268	106,841	-4672	-0.0419	0.3234
67	0.8496	103,284	-3557	-0.0333	0.2587
68	0.8805	100,629	-2654	-0.0257	0.2034
69	0.9142	97,805	-2824	-0.0281	0.2287

TABLE 3 Single Worker, Outside Income ($4,818 per year), No Low or Absent Earnings "Drop-Out" Years for CPP					
Last Year of Work	**Replacement Rate**	**SSW**	**Accrual**	**Accrual Rate**	**Tax/ Subsidy**
54	—	68,957	0	0	0
55	—	69,648	691	0.0100	-0.0352
56	—	69,456	-192	-0.0028	0.0100
57	—	68,700	-756	-0.0109	0.0390
58	—	67,949	-751	-0.0109	0.0397
59	0.1551	67,196	-753	-0.0111	0.0409
60	**0.1705**	**66,469**	**-727**	**-0.0108**	**0.0413**
61	0.1826	66,427	-42	-0.0006	0.0024
62	0.2002	66,622	195	0.0029	-0.0116
63	0.2211	66,884	262	0.0039	-0.0162
64	0.3616	65,278	-1606	-0.0240	0.1036
65	0.3752	63,202	-2076	-0.0318	0.1396
66	0.3884	60,804	-2398	-0.0379	0.1686
67	0.4032	58,435	-2369	-0.0390	0.1748
68	0.4175	55,777	-2658	-0.0455	0.2062
69	0.4320	52,951	-2826	-0.0507	0.2315

For retirement from age 65 onwards, however, there is nevertheless a substantial tax for this single worker which rises steadily with age. At the oldest ages in our computations, the results are once again similar for marrieds and singles, as wives have moved out of the range of SPA eligibility. The implicit tax or subsidy to continued work varies in the population for a number of reasons, such as marital status, life expectancy and earnings.

It is noted that these pension wealth accrual impacts are for the worker born in 1930 who worked continuously and hence never availed himself of the "drop-out" for low or no earnings years (up to 15% of all working years). Only in a small minority of cases would contributors born in 1930 not experience positive gains from continued CPP contributions after the age of 55 by using some or all of the "drop-out" years. Otherwise as will now be demonstrated the implied tax on further years of work at older ages when the "drop-out" is taken would occur much later than the age of 55.

The More Typical Case

Table 4 considers a different permutation to the earnings history: assuming that the married worker for these simulations was unemployed for four years, so that he has an incomplete earnings history (for the case with outside income). This offers an incentive for the worker to retire later, since additional years of work replace zeros in the computation of CPP benefits. This is illustrated by the sizeable subsidy to work through age 59; this subsidy arises due to the replacement of zero values in the earnings history. In this case the worker would have taken advantage of the "drop-out" for low or absent earnings for purposes of calculating the CPP retirement benefit.[25] The largest single group of CPP contributors born in 1930 consists of those for whom the drop-out likely was used prior to retirement. They would have positively gained in terms of further public pension wealth accruals from several more years of contributions after age 56, even to the age of 60, when a CPP discounted pension becomes available.[26]

As table 4 shows, this median wage worker with an incomplete earnings history (four years of unemployment) who retires on his 59th birthday has accumulated $122,213 in SSW. There is then a small increase in SSW for work during the 59th year. This is because the worker still has not completed his earnings history for full benefit eligibility, so that an additional year of work therefore replace a zero (a year with no earnings) in the benefits computation. After this point, additional earnings do not further maximize his SSW position. From age 60 to 62, there is an implicit tax rate on continued work (about 5%). Then, from age 63 onwards, the implicit tax rate rises sharply especially after the age of 65 when the OAS, GIS/SPA benefit begins to be paid to the working man and his spouse.

Similarly, more than four "zero years", or years with earnings lower than the YMPE, would offer an incentive to retire even later, in order to replace those low years with years of higher paid work. In practice, an incomplete earnings history may be the case for many or most workers, which would

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25 Simulations with the Social Policy Branch, HRDC, DYNACAN model indicates than the preponderance of men born in 1930 could have benefited from the utilization of the drop-out privilege to maximize their pension wealth positions. A 15% drop for the 24 working years for this typical individual born in 1930 when he reached the age of 60, or from the onset of the CPP in 1966 (when he was 36) to 1990 (when he was 60) would have amounted to 3.6 years. For the person who began working in 1966, at the age of 18 when CPP came into being, the drop-out of 15% could represent as much as 7 years (or 15% of the working years between 18 and 65 years of age).

26 Benefits are reduced (increased) 0.5% per month for each month before (after) one's 65th birthday that benefits are claimed, 6% per year, to a maximum actuarial adjustment of 30%. Benefits may not be claimed before the age of 60 or beyond age 70. A fair actuarial adjustment is made in the benefit depending on whether one received the pension before or after the 65th birthday between the ages of 60 and 70.

have a large impact on their incentives. More research is required to determine the actual patterns of earnings histories.

An examination of the income replacement rate in retirement for this individual is also revealing. At the first point of possible claiming of CPP (age 60), the replacement rate is roughly 20%. The replacement rate then rises sharply to age 65, as worker increase his SS benefits by delaying claiming. At the end of the 64th year (or age 65, on January 1, 1995), there is a large discrete jump, as the man's OAS benefit begins, and then a continued slow rise until the 67th year (or at age 68, on January 1, 1998) when another discrete jump occurs at around the commencement of the wife's OAS benefit. Thus, for the worker who works through his 69th year and collects on his 70th birthday, SS benefits for him and his wife replace roughly 91% of his after-tax earnings.

These results while they more typify the male worker's experience who was born in 1930 likely undervalue the public pension wealth gains from further work well beyond 55 and even perhaps 60. This is even more likely the case for later generations — those born in the post-war period. This is because of the longer schooling and training periods, and growing prevalence of non-standard work (part-time, contract, self-employment) experience for these generations.

These estimations simulated the effects of public pension wealth accruals for male workers. They ignore the greater prevalence of intermittent employment/earnings records of women than for men.[27]

Any decision as to when to retire would be influenced by many factors in addition to the point in time when the individual would maximize his/her public pension wealth position in present value terms, not least of all the standard of living after retirement. This would depend in particular, on the pre-retirement income replacement effect of not only public pensions (CPP/QPP, OAS/GIS/SPA) but of the combined replacement effect of public and private pensions.[28]

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27 DYNACAN simulations also reveal that more women than men would have benefited from the use of the "drop-out" privilege for calculating CPP retirement benefits. Moreover, female workers with children can drop-out child rearing years from the date when the last child was born to the date the last child reaches the age of 7. So for such women the drop out could well exceed 15% of the working years.

28 Public pensions represent a much smaller proportion of overall public and private pensions for middle and higher income workers.

The decision to retire would also be affected by many other factors, including the health of the individual or the spouse, any outside income sources, the adequacy of private pensions and the desire to work longer for a variety of reasons, (the ability and willingness to contribute to society, help other family members etc.).[29]

TABLE 4
Incomplete Earnings History, Outside Income ($4,818 per year), Assumes "Drop-Out" Years for CPP Retirement Pension Calculation

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	—	117,249	0	0	0
55	—	118,264	1015	0.0087	-0.0488
56	—	119,252	988	0.0084	-0.0487
57	—	120,247	995	0.0083	-0.0492
58	—	121,237	990	0.0082	-0.0505
59	0.1783	122,213	977	0.0081	-0.0515
60	**0.1995**	**121,293**	**-920**	**-0.0075**	**0.0508**
61	0.2155	120,387	-906	-0.0075	0.0509
62	0.2450	119,462	-925	-0.0077	0.0539
63	0.2696	118,295	-1167	-0.0098	0.0709
64	0.5085	115,617	-2678	-0.0226	0.1695
65	0.5186	111,257	-4361	-0.0377	0.2882
66	0.5275	106,582	-4675	-0.0420	0.3236
67	0.8497	102,978	-3604	-0.0338	0.2621
68	0.8807	100,323	-2654	-0.0258	0.2034
69	0.9143	97,499	-2824	-0.0281	0.2287

29 The Statistics Canada "Cycle 9" General Social Survey of 1994 reveals that male older workers choose to retire primarily for the following reasons: health concerns (29%), old enough to retire (16%) and early retirement (9%). Some of the same reasons in addition to family responsibilities and unemployment motivate female older workers to retire: health concerns (24%), personal choice (20%), family responsibilities (15%), old enough to retire (13%) and unemployment (8%).

4. Conclusions

The system of retirement income provision in Canada is an important consideration, among others, in the decision of older workers of when to retire. This set of four programs (CPP, OAS, GIS, SPA) provides a large source of income support for retired workers, but it also potentially taxes continued work among those who wish to work beyond the age of early retirement eligibility. This research suggests that there is potentially an important incentive effect of these public pension programs on the timing of retirement, particularly from age 65 when GIS/SPA is a factor, when viewed in isolation from the private retirement benefits. Future work on retirement in Canada could usefully explore the effect of program generosity on retirement behaviour. In particular, it is important to assess the role that these implicit taxes play in determining actual retirement decisions, both on average, and across groups of workers that face very different incentives, for example high vs. low earners as well as workers with different earnings histories.

There is potentially an important effect of these programs on the timing of retirement. Future work on retirement in Canada could usefully explore the role that these implicit taxes play in determining actual retirement decisions, both on average, and across groups of workers that face very different incentives, for example high vs. low earners... through employer-provided pensions (RPPs) and individual retirement savings incentives (RRSPs). An important priority for future work in this area is to incorporate these incentives into the calculations of the overall effects of retirement income support on retirement behaviour in Canada.

It is important to note that this paper has considered only the retirement incentives inherent in public retirement income programs. Canada also has a rich array of private retirement income support mechanisms, through employer-provided pensions (RPPs) and individual retirement savings plans, such as RRSPs. Many of these plans are of the "defined contribution" nature, whereby a worker's benefits are dependent only on the amount contributed and not on the date of retirement per se, so that there will be no retirement incentives of the type described here. But, on the other hand, many of the employer provided pension plans are "defined benefit" plans, where benefits do vary with the age of retirement. An important priority for future work in this area is to incorporate RPP defined benefit-type plans into the calculations of the overall effects of retirement income support on retirement behaviour in Canada.

This paper does not investigate the extent to which implicit taxes influence actual behaviour, nor does it assess their relative importance compared to other factors in the retirement decision such as health or job layoffs. Further research could investigate the range of factors and their relative importance in the decision to retire.

Appendix A: Data Sources

Historical Data:

1. Labour Force Participation data are from Statistics Canada's (Canadian Socio-Economic Information Management System) CD-Rom, as well as data provided directly by Statistics Canada.

2. Population data are from:

   a) Economic Council of Canada. *People and Jobs: A Study of the Canadian Labour Market.* Ottawa: Information Canada, 1976.

   b) Denton, Frank D. and Sylvia Ostry. *Historical Estimates of the Canadian Labour Force.* Ottawa: Dominion Bureau of Statistics, 1967.

   c) Statistics Canada. Ottawa: *Historical Labour Force Statistics*, 1995.

3. Data on program receipt are from:

   a) Human Resources Development Canada (1996). *Statistics Related to Income Security Programs.* Ottawa: HDRC.

Contemporaneous Data:

All contemporaneous figures tabulated by author from April Survey of Consumer Finances data for 1992 and 1993.

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