

Research Paper

Analytical Studies Branch Research Paper Series

Pension Coverage, Retirement Status, and Earnings Replacement Rates Among a Cohort of Canadian Seniors

by Yuri Ostrovsky and Grant Schellenberg

Social Analysis Division
24-J, R.H. Coats Building, 100 Tunney's Pasture Driveway
Ottawa, Ontario K1A 0T6

Telephone: 1-800-263-1136



Pension Coverage, Retirement Status, and Earnings Replacement Rates Among a Cohort of Canadian Seniors

by
Yuri Ostrovsky and Grant Schellenberg

11F0019M No. 321
ISSN 1205-9153
ISBN 978-1-100-14521-1

Statistics Canada
Social Analysis Division

How to obtain more information:
National inquiries line: 1-800-263-1136
E-Mail inquiries: infostats@statcan.gc.ca

December 2009

Published by authority of the Minister responsible for Statistics Canada

© Minister of Industry, 2009

All rights reserved. The content of this electronic publication may be reproduced, in whole or in part, and by any means, without further permission from Statistics Canada, subject to the following conditions: that it be done solely for the purposes of private study, research, criticism, review or newspaper summary, and/or for non-commercial purposes; and that Statistics Canada be fully acknowledged as follows: Source (or "Adapted from," if appropriate): Statistics Canada, year of publication, name of product, catalogue number, volume and issue numbers, reference period and page(s). Otherwise, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form, by any means—electronic, mechanical or photocopy— or for any purposes without prior written permission of Licensing Services, Client Services Division, Statistics Canada, Ottawa, Ontario, Canada K1A 0T6.

La version française de cette publication est disponible (n° 11F0019M au catalogue, n° 321).

Note of appreciation

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

Standards of service to the public

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

Analytical Studies Research Paper Series

The Analytical Studies Research Paper Series provides for the circulation, on a pre-publication basis, of research conducted by Branch staff, visiting Fellows and academic associates. The Research Paper Series is intended to stimulate discussion on a variety of topics including labour, business-firm dynamics, pensions, agriculture, mortality, language, immigration, statistical computing and simulation. Readers of the series are encouraged to contact the authors with comments, criticisms and suggestions. A list of titles appears at the end of this document.

Papers in the series are distributed to research institutes and specialty libraries. These papers can be downloaded from the Internet at www.statcan.gc.ca.

Publications Review Committee
Analytical Studies, Statistics Canada
24th Floor, R.-H. Coats Building
Ottawa, Ontario K1A 0T6

Symbols

The following standard symbols are used in Statistics Canada publications:

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

Table of contents

Abstract	5
Executive summary	6
1 Introduction.....	7
2 Data and methodology	8
3 Descriptive results.....	13
4 Multivariate results	23
5 Conclusions and implications	28
Appendix	30
References	33

Abstract

Data from the Longitudinal Administrative Data (LAD) base are used to compare the retirement status and earnings replacement rates achieved by individuals who were, and individuals who were not, Registered Pension Plan members in 1991 and/or 1992, when they were in their mid-fifties. Among men in this cohort, the likelihood of being retired at age 70 to 72 was about 4 to 14 percentage points higher among pension plan members than non-members. Data used for the study do not provide information on why RPP non-members tend to retire later than do members. Among **retired** individuals, earnings replacement rates did not differ significantly between RPP members and non-members.

Keywords: pensions, retirement, seniors

Executive summary

The extent to which working-age Canadians are making adequate financial preparations for retirement is an important and widely-discussed issue. Declining rates of pension coverage, the changing characteristics of pension plans, and the financial health of some private sector plans are important considerations in this regard. These also raise questions about the financial outcomes likely to be experienced in old age by pension members and non-members. Optimally, information on wealth would be used to assess such questions; however, up-to-date and comprehensive information on wealth is not available.

As an alternative, this paper compares the retirement transitions and income characteristics of seniors who were, and seniors who were not, pension plan members earlier in life. More specifically, the Longitudinal Administrative Data (LAD) base is used to identify employed Canadians who were, and employed Canadians who were not, pension plan members in 1991 and/or 1992, when they were in their mid-fifties. These same individuals are identified twelve to fifteen years later, when in their late sixties and early seventies. Amounts and sources of income received, retirement status, and earnings replacement rates are compared between groups.

Descriptive statistics show that pension members receive more income than do non-members from pensions and superannuations—including income from pension benefits, Registered Retirement Income Funds (RRIFs), and annuities. However, average incomes from other sources (such as: the Guaranteed Income Supplement; interest, investments and dividends; and capital gains) are higher among non-members.

The likelihood of being retired is estimated for pension plan members and non-members using multivariate techniques. Among men, the predicted probability of being retired at age 70 to 72 is 4 to 14 percentage points higher among pension plan members than non-members, with the difference largest among those from the high end of the pre-retirement earnings distribution. Whether individuals who do not have pensions defer retirement to older ages by choice or by necessity cannot be discerned from our data.

Among **retired** tax filers, our study does not show a consistent correlation between pension plan membership and earnings replacement rates achieved at age 70 to 72. The robustness of these findings is confirmed when the analysis is replicated for the years 2003 to 2005.

The terms *RPP membership* and *RPP coverage* are used interchangeably in this paper.

1 Introduction

Registered Pension Plans (RPPs) and Registered Retirement Savings Plans (RRSPs) are generally viewed as comprising the third tier of Canada's retirement income system, with Old Age Security and the Guaranteed Income Supplement (GIS) comprising the first tier and the Canada Pension Plan (CPP)/Quebec Pension Plan (QPP) comprising the second. The role that the third tier of the system will play in the financial futures of tomorrow's seniors has come under renewed scrutiny in recent years. Declining rates of RPP coverage, a shift from defined-benefit (DB) to defined-contribution (DC) plans, and questions surrounding the financial soundness of some private-sector plans are among the reasons why RPPs are centre-stage. A further reason is the potential implications of these changes for the retirement transitions and retirement savings of tomorrow's seniors.

Optimally, information on wealth is needed in order to assess the adequacy of the financial preparations for retirement made by working-age Canadians. Comprehensive and up-to-date information on wealth held in the form of real estate, Registered Retirement Savings Plans (RRSPs), Tax-Assisted Savings Plans, accrued pension benefits, non-registered financial assets, and other assets could be used to estimate the value of income streams likely to be generated in old age. Whether or not these estimated income streams differ between pension plan members and non-members would be useful to assess. However, because wealth information is not available, the relationship between pension coverage and financial outcomes in old age cannot be assessed in this way.

Rather than focusing on working-age Canadians, this paper instead examines the financial characteristics of Canadians now in their early seventies—that is, today's retirees, rather than tomorrow's. Using data from the Longitudinal Administrative Data (LAD) base, we identified individuals who were aged 55 to 57 in 1991 and grouped them on the basis of whether or not they had pension coverage in 1991 and/or 1992. Our study followed up with these same individuals twelve to fifteen years later, when in their late-sixties and early seventies, and their retirement transitions and financial outcomes were compared. Again, the availability of wealth data would have strengthened the analysis, enabling us to determine whether pension members and non-members have comparable levels of wealth from which to derive income. Given that such information is not available, we instead focus on the retirement transitions and income characteristics of pension members and non-members. The importance of home ownership and other assets is not captured by this focus.

Analytical emphasis may be placed on a variety of issues when one examines the relationship between pension coverage and retirement outcomes. One could consider the **timing of retirement** and whether RPP members leave the workforce at younger ages than do non-members. Among Canadians in their forties and fifties, pension members typically expect to retire earlier than do non-members and express more certainty in their retirement plans (Schellenberg and Ostrovsky 2008). Alternatively, one could examine the **reasons for retirement**, such as the extent to which RPP members and non-members retire under terms and conditions of their own choosing, or the extent to which they weigh financial, health, or other considerations in their decision to retire or stay on the job. One could also examine **financial outcomes**, such as the sources and amounts of retirement income that RPP members and non-members receive in old age.

Descriptive information shows that, on average, pension members receive more income than do non-members from pensions and superannuations—including income from pension benefits, Registered Retirement Income Funds (RRIFs), and annuities. However, average incomes from other sources (such as: the Guaranteed Income Supplement; interest, investments and dividends; and capital gains) are higher among non-members.

The likelihood of being retired is estimated for pension plan members and non-members by use of multivariate techniques. Among men, the predicted probability of being retired at age 70 to 72 is 4 to 14 percentage points higher among pension plan members than non-members, with the difference largest among those from the high end of the pre-retirement earnings distribution. This is also the case among women. Whether individuals who do not have pensions defer retirement to older ages by choice or by necessity cannot be discerned from our data. It is likely that this is a choice for some, reflecting a preference to keep working, and a necessity for others, reflecting concerns about retirement savings.

Among **retired** tax filers, pension coverage is not consistently associated with earnings replacement rates achieved at age 70 to 72. The robustness of these findings is confirmed when the analysis is replicated for the years 2003 to 2005.

In addition to the relationship between RPP coverage and replacement rates, other factors associated with replacement rates are also considered, including immigration status, change in marital status, and years since retirement. These three factors are significantly associated with replacement rate outcomes.

Because RPP coverage is predicated on labour force participation and positively correlated with earnings, this paper focuses on individuals who had substantial attachment to the paid labour force when in their mid-fifties. The financial outcomes experienced by individuals who had modest, sporadic, or no attachment to the paid labour force at that age are not reflected in the results.

This paper is organized into several sections. In section 2, data and methodological issues are addressed, including sample selection and definitions of key concepts. In section 3, descriptive information is presented on the amounts and sources of the income received by RPP members and non-members at age 70 to 72. In section 4, results from two sets of multivariate regression models are presented, the first documenting the characteristics associated with retirement status at age 70 to 72, and the second documenting the characteristics associated with the replacement rates achieved by retirees at that age. Conclusions and implications are discussed in section 5.

2 Data and methodology

Data

Data for this study are from the 20% version of the Longitudinal Administrative Data (LAD) base, which is derived from taxation data. LAD files provide detailed information on both individual and family income for persons who filed an income tax return between 1982 and 2006. The 20% sample is randomly selected from all tax-filing Canadians, and, once selected, individuals remain in the sample for as long as they appear on the annual T1 Family File (T1FF).¹

1. The population of interest for the T1 Family File (T1FF) is all members of Canadian families (families that include at least one person living in Canada). For cross-sectional purposes, in any specific reference year, the data cover all persons who completed a T1 tax return for that year or who received Canada Child Tax Benefit payments in that year, their spouses who did not file a tax return, their children who did not file a tax return, and their children who reported the same address as the tax-filing parent.

Sample selection

The focus of this study on RPP coverage has implications for the cohort of tax filers selected. The information in the LAD does not allow RPP members and non-members to be distinguished on the basis of the retirement income they receive in old age. This is because RRSP savings that have been converted into income streams through Registered Retirement Income Funds (RRIFs) or used to purchase annuities are aggregated into the same category as RPP benefits (pensions and superannuations). Consequently, it is necessary to identify RPP members and non-members on the basis of the RPP contributions they made while still in the workforce. Information on employer and employee contributions to RPPs is available in the LAD back to 1991.

The fact that individuals in their sixties who have RRSP assets may not yet be receiving retirement income from those assets is a further consideration for sample selection. In 2006, the last year of our study, individuals were eligible to contribute to their RRSPs until the end of the year in which they turned 69. Individuals aged 70 or older were no longer eligible to contribute, and had to withdraw their RRSP savings as income, convert their RRSP savings into a RRIF, or use their RRSP savings to purchase an annuity. Given these requirements, the likelihood of observing the role that RRSPs play in the income streams of seniors in 2006 is greater among tax filers aged 70 or older than among younger age groups.²

Together, our opting to focus on tax filers aged 70 or older in 2006 and the restriction of identifying RPP membership no earlier than 1991 limit the size of the cohort of tax filers available for the analysis. Individuals aged 54 or younger in 1991—the first year complete RPP contribution information is available—had not yet reached age 70 in 2006. Hence, 55 in 1991 is the minimum age of tax filers included in our analysis. As regards the maximum age, individuals who were 60 or 62 in 1991 were well past age 70 in 2006, but such individuals may not be representative of RPP members more broadly. This is because RPP members with many years of pensionable service may have already left the workforce by their early sixties, perhaps with those most financially well-prepared for retirement most likely to do so. The inclusion of ‘sixty-somethings’ in our sample could thus result in selection bias and under-estimations of the replacement rates achieved by RPP members.³ To reduce the potential for such bias, we limit our sample to tax filers who were no older than 57 in 1991, on the grounds that retirement rates were lower among individuals below this (admittedly arbitrary) age than individuals above it.⁴ For these reasons, our analysis is limited to tax filers who were aged 55 to 57 in 1991 and hence aged 70 to 72 in 2006.

Several other selection criteria are imposed. Participation in, and contributions to, RRSPs and RPPs are predicated on labour force participation and receipt of employment earnings. Consequently, our analysis is limited to individuals who filed a tax return in 1989, 1990, and 1991, who had positive earnings in each of those years, and whose average annual earnings over that period were \$10,000 or more. Earnings are defined as the sum of T4-reported earnings (i.e., wages, salaries and commissions) and other employment income (such as tips and gratuities). Individuals who were self-employed at age 55 to 57 are excluded because they were generally not

-
2. Tax legislation was subsequently changed, and, in 2007, Canadians were eligible to contribute to their RRSPs until the end of the year in which they turned age 71.
 3. For example, in 1991 the average retirement age was 60.7 years for public-sector employees and 62.7 years for private-sector employees. Consequently, identifying RPP members still in the workforce at age 62 would thus result in the under-representation of public sector employees, many of whom have years of pensionable service accumulated in defined-benefit pension plans.
 4. Another option would have been to limit the sample to individuals no older than 56 in 1991, but this more restrictive criterion involves a trade-off with decreasing sample size. The 55-to-57-year age group we select reflects the trade-off between reduction of potential selection bias and maintaining sample size.

eligible to contribute to RPPs.⁵ However, those who had become self-employed by age 70 to 72 are included. Finally, individuals who had total incomes before taxes of \$500,000 or more in 2006 were excluded in order to reduce the effects of very high values on the calculations of average incomes. The resulting sample is comprised of about 32,200 men and 23,800 women. Individuals are the unit of analysis throughout the paper.

These selection criteria yield a sample of individuals who had strong labour force attachment over the 1989-to-1991 period. Readers are reminded that women in their fifties at that time had considerably lower employment rates than women in that age group do today. Between 1989 and 2006, the share of women aged 50 to 54 with employment increased from 59% to 75%, and the share aged 55 to 59 with employment increased from 42% to 59%. Limiting our sample to women with employment in all three years of the reference period and average annual earnings of at least \$10,000 yields a sample that is likely less representative of the total population of women than such a sample would be of the total population of men at that time.⁶

Defining RPP coverage

In spite of the importance of RPPs in Canada's retirement income system, individual-level information on RPP contributions and characteristics is somewhat limited. A 'Pension Adjustment' variable is available on the LAD back to 1991, and this variable is used in this analysis. The Pension Adjustment variable captures both employee and employer contributions to RPPs, as well as contributions to Deferred Profit Sharing Plans (DPSPs). The inclusion of DPSPs likely results in a modest over-estimation of RPP coverage.⁷ The LAD also includes information on employee contributions to RPPs back to 1986, but this information does not capture participation in employer-only contribution plans. Evidence from Morissette and Ostrovsky (2006) indicates that in 1991 this resulted in an under-estimation of RPP coverage of almost 17 percentage points among married men aged 35 to 54, and an under-estimation of about 11 percentage points among married women aged 35 to 54.⁸ Such under-estimation would yield incorrect estimates of the replacement rate differential between RPP members and non-members. It is for this reason that the Pension Adjustment variable is used.

Positive values on the Pension Adjustment variable in 1991 and 1992 are coded to "1" to flag RPP membership in each year, while values of "0" are used to flag RPP non-membership. Respondents are then assigned a value of 0, 1, or 2 indicating they had RPP coverage in neither year, one of the two years, or both years, respectively. Other strategies for identifying RPP coverage were tested and found to be less accurate than this approach.⁹ Nonetheless, the fact that RPP coverage is measured in only two years raises concerns about the strength of the variable. If significant numbers of individuals move into or out of jobs offering RPP coverage over a longer period of time, coverage in any single year may be a poor measure of lifetime contributions.

While LAD data do not allow us to examine the RPP histories of the individuals in our sample, they do provide some insights on the RPP histories of the comparable group of tax filers who were aged

-
5. Tax filers with modest self-employment incomes (less than \$500 annually) were retained in the sample.
 6. The employment rates of men aged 50 to 54 were 84% and 85% in 1989 and 2006, respectively, while for men aged 55 to 59 they were 73% and 72%, respectively.
 7. In 1993, members of DPSPs accounted for 7% of RPP members.
 8. The corresponding figures for unmarried men and women in that age group are 13 and 7 percentage points, respectively.
 9. For example, the number of years each tax filer had made an employee contribution to an RPP was calculated for the years 1986 to 1992. Of those who had not made a contribution in any year, over one-quarter reported a positive pension adjustment in 1991. The use of the employee contribution variable was dropped as a result of this under-estimation of pension coverage.

55 to 57 in 2001. RPP coverage information is available for this group back to 1991; this allows us to assess how well coverage in two years (i.e., 2001 and 2002) captures patterns over the preceding decade. Tax filers aged 55 to 57 in 2001 (Table 2) were selected on the basis of the same selection criteria as those used for the tax filers in our analysis.¹⁰ Of the tax filers who had RPP coverage in both 2001 and 2002, 67% had coverage over all ten years in the preceding decade, and 82% had coverage for at least eight of the ten years. This suggests that RPP coverage in two years is a reasonable proxy for coverage over the longer-term—at least among tax filers age 55 to 57. Of the tax filers who did not have RPP coverage in either 2001 or 2002, 71% did not have coverage in any year over the preceding decade, and 80% had coverage for three years or less. Again, the absence of RPP coverage in two years appears to be a reasonable proxy for longer-term coverage. That being said, it is noteworthy that almost 12% of tax filers who did not have RPP coverage in 2001 or 2002 had coverage in eight or more years over the previous decade. What accounted for the change in their RPP status cannot be determined from the LAD. The inclusion of some individuals with prior RPP coverage in the RPP ‘non-members’ group will likely diminish differences in the financial outcomes documented across this variable.

Table 1
Tax filers aged 55 to 57 in 2001: Number of years of Registered Pension Plan (RPP) coverage over the previous decade, by RPP status in 2001 and 2002

Number of years of coverage in the previous decade	RPP coverage in 2001 and 2002		
	In neither 200 nor 2002	In either 2001 or 2002	In both 2001 and 2002
	percent		
None	70,7	8,4	1,5
One	3,7	2,6	1,7
Two	2,9	2,3	1,9
Three	2,6	2,4	2,0
Four	2,2	2,3	2,3
Five	2,1	2,3	2,3
Six	2,1	2,6	2,7
Seven	2,2	3,1	3,5
Eight	2,5	5,4	4,8
Nine	3,5	10,2	10,0
Ten	5,5	58,4	67,3
Total	100,0	100,0	100,0

Source: Statistics Canada, Longitudinal Administrative Data (LAD).

Defining replacement rates

The central objective of this paper is to compare the incomes that RPP members and non-members receive after retirement relative to the earnings they received prior to it—that is, replacement rates. Yet, in spite of the fact that replacement rates are central in discussions about the retirement income system, there is no single definition of the concept and no single way to measure it.

10. It should be noted the cohorts who were aged 55 to 57 in 1991 and in 2001 faced similar economic circumstances over the previous decade. Those aged 55 to 57 in 1991 were in their late forties during the recessionary period of 1982-83, and in their early fifties during the expansionary period in the late 1980s. Similarly, individuals aged 55 to 57 in 2001 were in their late forties during the recessionary period of 1992-93, and in their early fifties during the expansionary period in the late 1990s.

Table 2
Average transfer income received by men in 2006, by 1989-to-1991 earnings quintile and Registered Pension Plan (RPP) status

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
			dollars		
Lower bound of earnings quintile	10,000	32,800	45,750	58,200	76,100
			percent		
Pension coverage 1991 to 1992					
No PA in 1991 or 1992	77.5	44.7	28.5	21.2	22.8
PA in either 1991 or 1992	7.9	10.9	12.4	12.7	10.1
PA in both 1991 and 1992	14.6	44.4	59.1	66.1	67.1
Total	100.0	100.0	100.0	100.0	100.0
			dollars		
Average annual earnings (1989 to 1991)					
No PA in 1991 or 1992	22,300	39,050	51,450	65,800	138,500
PA in either 1991 or 1992	24,200	39,850	51,950	66,200	106,800
PA in both 1991 and 1992	25,500	40,150	51,800	66,500	107,750
Average income from Guaranteed Income Supplement (GIS), as a net federal supplement (NFS) (2006)					
No PA in 1991 or 1992	1,850	900	600	350	100
PA in either 1991 or 1992	1,200	650	300	150	50
PA in both 1991 and 1992	1,250	500	250	100	50
Average income from Old Age Security (OAS) (2006)					
No PA in 1991 or 1992	5,650	5,850	5,850	5,850	5,700
PA in either 1991 or 1992	5,850	5,850	5,850	5,900	5,850
PA in both 1991 and 1992	5,750	5,850	5,900	5,900	5,800
Average income from Canada Pension Plan (CPP)/Quebec Pension Plan (QPP) (2006)					
No PA in 1991 or 1992	6,500	8,150	8,450	8,500	8,550
PA in either 1991 or 1992	7,250	7,850	7,750	7,650	7,200
PA in both 1991 and 1992	6,900	8,100	8,200	7,950	7,600
Average income from other transfers (2006)					
No PA in 1991 or 1992	950	800	600	400	250
PA in either 1991 or 1992	900	750	600	550	200
PA in both 1991 and 1992	900	650	650	450	250
Average total transfer income (2006)					
No PA in 1991 or 1992	14,950	15,700	15,500	15,100	14,600
PA in either 1991 or 1992	15,200	15,100	14,500	14,250	13,300
PA in both 1991 and 1992	14,800	15,100	15,000	14,400	13,700

Notes: All dollar amounts have been rounded to the nearest \$50 and are expressed in constant 2007 dollars. PA stands for *pension adjustment*. All tax filers are included in the calculation of average amounts regardless of whether they received income from the source.

Source: Statistics Canada, Longitudinal Administrative Data (LAD)

For this analysis, incomes received from various sources (before taxes) in 2006 are included in the numerator of the replacement rate calculation, while average annual earnings (before taxes) received in 1989, 1990, and 1991 are included in the denominator. Earnings are averaged over three years to account for fluctuations in employment that might occur from one year to the next. The use of earnings rather than total income in the denominator is based on the argument that maintaining one's standard of living in old age requires one to replace only those sources of income that cease at retirement (Horner 2007). Sources of income such as interest and dividends presumably do not have to be replaced following retirement. The share of 1989-1991 earnings 'replaced' by various income sources in 2006 is examined through both descriptive and multivariate

statistics, below. All earnings and income figures are expressed *before tax* and in constant 2007 dollars.¹¹

The LAD base does not contain information on the wealth of tax filers, such as the equity they may own in their home or other real estate, other non-financial assets, or savings in non-registered accounts. Such assets may be used to finance consumption in old age, but are not included in income for the purposes of taxation, nor are they included in the replacement rates presented below.

Earnings quintiles

Comparing the financial outcomes of RPP members and non-members is facilitated by taking their earnings in 1989-1991 into account. As noted in other studies (LaRochelle-Côté, Picot, and Myles 2007; Smith 2003), replacement rates are negatively correlated with earnings—that is, replacement rates are highest among individuals at the bottom of the earnings distribution and lowest among those at the top. The incidence of RPP coverage and the presence of RRSP contributions, however, are positively correlated with earnings. Given these considerations, tax filers in the sample are categorized into five groups of equal size according to their average annual earnings over 1989-1991. The extent to which earnings are replaced by other income sources at age 70 to 72 can thus be examined at different points across the distribution. Results are presented separately for men and women on the grounds that their employment histories and financial characteristics tend to differ. There are just over 6,400 men and 4,700 women in each quintile.

3 Descriptive results

Men

Descriptive information on the financial characteristics of men in our sample is shown in Table 3, disaggregated by earnings quintile and RPP coverage. The positive correlation between earnings and RPP coverage is evident, as the share of men with an RPP in both 1991 and 1992 was 15% in the bottom quintile (Q1), 59% in the middle quintile (Q3), and 67% in the top quintile (Q5). For ease of presentation, comparisons in this section are drawn between individuals who had RPP coverage in neither year or individuals who had RPP coverage in both years. These groups are referred to as RPP members and non-members, respectively.

By definition, the minimum earnings in 1989-1991 of men in the bottom quintile were \$10,000, while the minimum earnings of men in the middle and top quintiles were about \$46,000 and \$76,000, respectively. Within quintiles, average 1989-1991 earnings were comparable among RPP members and non-members, differing by about \$400 to \$1,100 in Q2, Q3, and Q4. In the top quintile (Q5), RPP members earned almost \$31,000 *less*, on average, than non-members.

Turning to income received in 2006, we first consider government transfers. Average income in the form of Net Federal Supplements (NFS) (which include the GIS) and other income support declined across 1989-1991 earnings quintiles, reflecting the program's objective to provide support to low-income seniors. Men from the bottom quintile (Q1) who did not have RPP coverage

11. Previous analyses shows that a consumer price index (CPI) established for a given sub-group—such as individuals near the bottom or the top of the income distribution—does not differ substantially from the CPI for the entire population. Hence, we apply the same CPI to all individuals in our sample. See: Taktek, Nathalie. June 1998. *Comparative Study of Analytical Consumer Price Indexes (CPI) for Different Subgroups of the Reference Population*. Catalogue no. 62F0014MIB. Ottawa: Statistics Canada.

received, on average, almost \$1,900 from GIS/NFS while men with RPP coverage received almost \$1,300. (Readers should note that all tax filers are included in the calculation of average amounts regardless of whether they received income from the source.) As shown in Appendix Table 1, the incidence of GIS/NFS receipt was higher among men who did not have RPP coverage than among those who did, with the difference between groups ranging from about 8 to 13 percentage points within most quintiles.

Table 3
Average market income received by men in 2006, by 1989-to-1991 earnings quintile and Registered Pension Plan (RPP) status

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Average earnings (2006)	dollars				
No PA in 1991 or 1992	1,900	3,250	5,250	7,000	20,050
PA in either 1991 or 1992	1,050	1,050	1,200	1,400	4,900
PA in both 1991 and 1992	1,550	850	1,050	1,550	5,150
Average net self-employment income (2006)					
No PA in 1991 or 1992	150	400	350	400	2,400
PA in either 1991 or 1992	0	0	150	150	2,050
PA in both 1991 and 1992	0	50	50	50	800
Average Registered Retirement Savings Plan (RRSP) income (2006)					
No PA in 1991 or 1992	250	350	750	450	1,550
PA in either 1991 or 1992	200	350	600	450	1,100
PA in both 1991 and 1992	300	200	400	550	850
Average pension and superannuation income (2006)					
No PA in 1991 or 1992	5,350	8,150	12,700	17,000	29,200
PA in either 1991 or 1992	8,350	11,600	16,850	24,850	40,800
PA in both 1991 and 1992	7,950	11,600	16,200	23,150	42,800
Average income from interest, investments, and dividends (2006)					
No PA in 1991 or 1992	1,800	2,700	3,700	5,850	19,700
PA in either 1991 or 1992	1,250	1,100	1,450	3,000	5,600
PA in both 1991 and 1992	850	900	1,200	1,700	4,350
Average income from other market sources (2006)					
No PA in 1991 or 1992	800	1,250	1,250	2,550	5,050
PA in either 1991 or 1992	600	600	800	850	1,400
PA in both 1991 and 1992	500	550	950	1,050	2,150
Average total market income (2006)					
No PA in 1991 or 1992	10,200	16,150	23,950	33,250	77,950
PA in either 1991 or 1992	11,450	14,650	21,050	30,700	55,850
PA in both 1991 and 1992	11,200	14,200	19,750	28,000	56,050

Notes: All dollar amounts have been rounded to the nearest \$50 and are expressed in constant 2007 dollars. *PA* stands for *pension adjustment*. All tax filers are included in the calculation of average amounts regardless of whether they received income from the source.

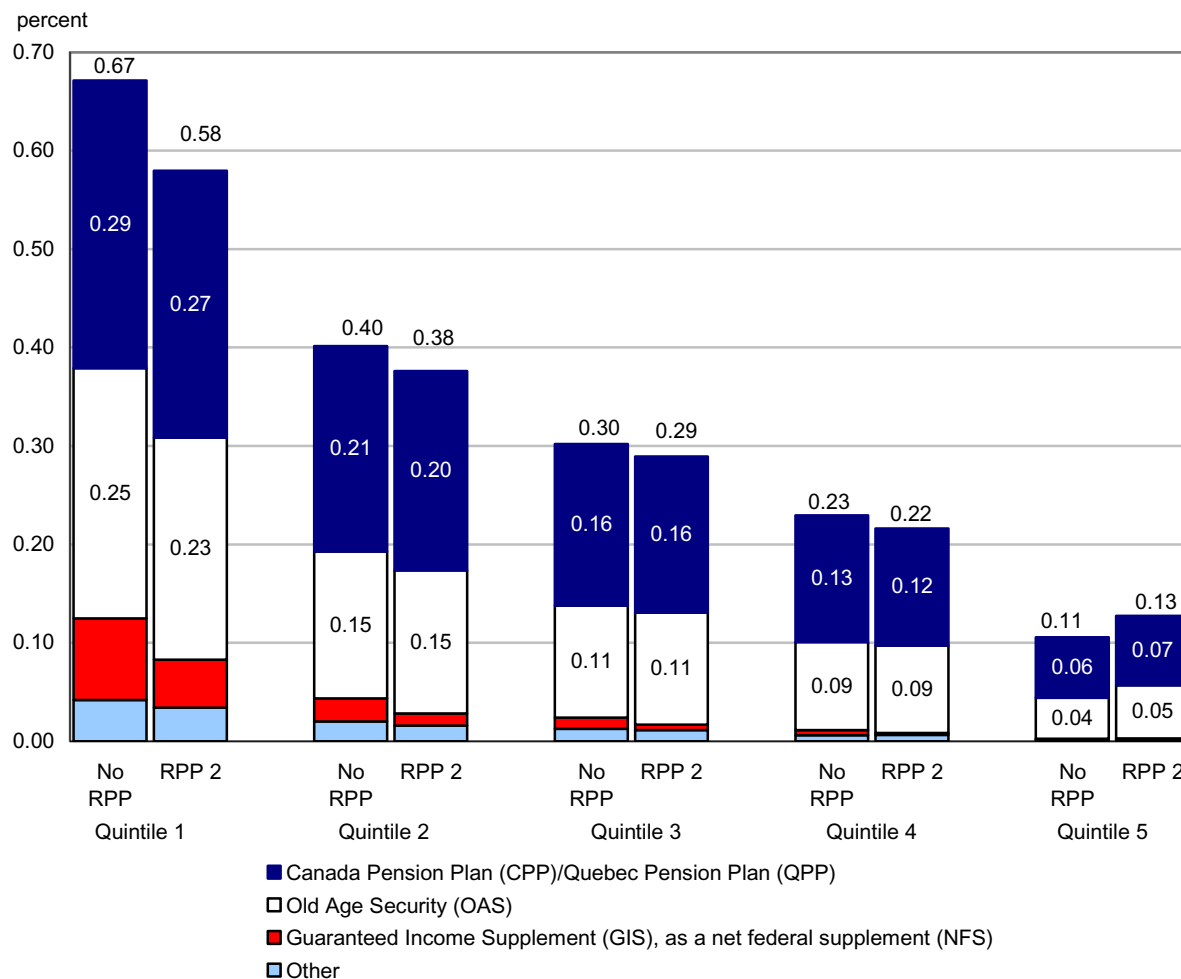
Source: Statistics Canada, Longitudinal Administrative Data (LAD).

Most men in the sample received Old Age Security (OAS) benefits near the maximum amount—with average benefits ranging from about \$5,600 to \$5,900 across quintiles. There was little difference in the average amounts received by RPP members and non-members. In all quintiles, CPP/QPP benefits accounted for the largest share of government transfers received in 2006, with average benefits ranging from about \$6,500 to \$8,500. Differences of less than \$600 were evident between RPP members and non-members in most quintiles. Finally, average income from other government transfers, such as refundable tax credits and provincial income supplements, ranged from about \$300 to \$900 across quintiles, again with little difference between RPP members and non-members.

Overall, average government transfer income in 2006 was generally between \$14,000 and \$16,000 among the men in the sample. The average amount received was slightly lower among RPP members than non-members—a difference of about \$200 to \$700 in most quintiles—reflecting slightly lower average incomes from GIS and CPP/QPP.

When translated into proportions of average earnings received in 1989-1991, government transfers played a comparable earnings replacement role for RPP members and non-members in 2006 (Chart 1). Among men in the third quintile, for example, government transfers accounted for 29% of 1989-1991 earnings of RPP members and for 30% of the earnings of non-members for that same period. Similarly, the earnings replacement role played by government transfers was within one to two percentage points among both RPP members and non-members in Q2, Q4, and Q5. A larger difference was evident in Q1, where government transfers accounted for 58% of the earnings of both RPP members and 67% of those of non-members. Average transfer income received by each group was virtually identical in 2006; hence, this difference was attributable to the slightly higher earnings among RPP members in 1989-1991.

Chart 1
Men aged 70 to 72: Transfer income received in 2006 as a percent of average annual earnings in 1989 to 1991, by Registered Pension Plan (RPP) status



Notes: 'No RPP' means that no Registered Pension Plan income was received in 1991 and 1992. 'RPP 2' means that a Registered Pension Plan income was received in both 1991 and 1992.

Our study also looked at sources of market income received in 2006; average earnings from such sources varied considerably both *across* and *within* quintiles. Among RPP non-members, average earnings in 2006 ranged from about \$1,900 among men in Q1 to almost \$21,000 among men in Q5 (Table 3). *Within* quintiles, average earnings in 2006 were considerably lower among RPP members than non-members, with this difference ranging from about \$2,400 to \$5,500 among men in Q2 to Q4, and reaching almost \$15,000 in Q5. As will be shown below, RPP members were far more likely than non-members to have retired by 2006.

Men in the sample generally received an average of less than \$800 directly from Registered Retirement Savings Plans (RRSPs) in 2006, with little difference between RPP members and non-members in this regard (Table 3).¹² The largest share of market income was generally received from pensions and superannuations, with average amounts from this source rising across quintiles. Within earnings quintiles, average pension and superannuation income was significantly higher among RPP members than non-members, with the difference ranging from \$3,500 to \$6,200 in Q2 to Q4. Readers are reminded that pensions and superannuation income includes RPP benefits as well as income from annuities and Registered Retirement Income Funds (RRIFs). It should also be noted that tax filers who were RPP *non-members* in 1991 and 1992 may have been pension members earlier in their working lives and hence in receipt of RPP benefits.

While pension and superannuation income was higher among RPP members than non-members, the opposite was true for interest, investments and dividends. Income from these sources was lower among RPP members than non-members, with the difference ranging from \$1,800 to \$4,200 in Q2 to Q4. Average incomes from other market sources, such as rental income, retiring allowances and grants, were also somewhat lower among RPP members.

Overall, total market income in 2006 ranged from about \$10,000 to \$11,000 among men in Q1 to almost \$56,000 or more among men in Q5. On average, RPP members received more from pensions and superannuations than did non-members, but less from interest, investments, and dividends, from earnings, and from other market sources.

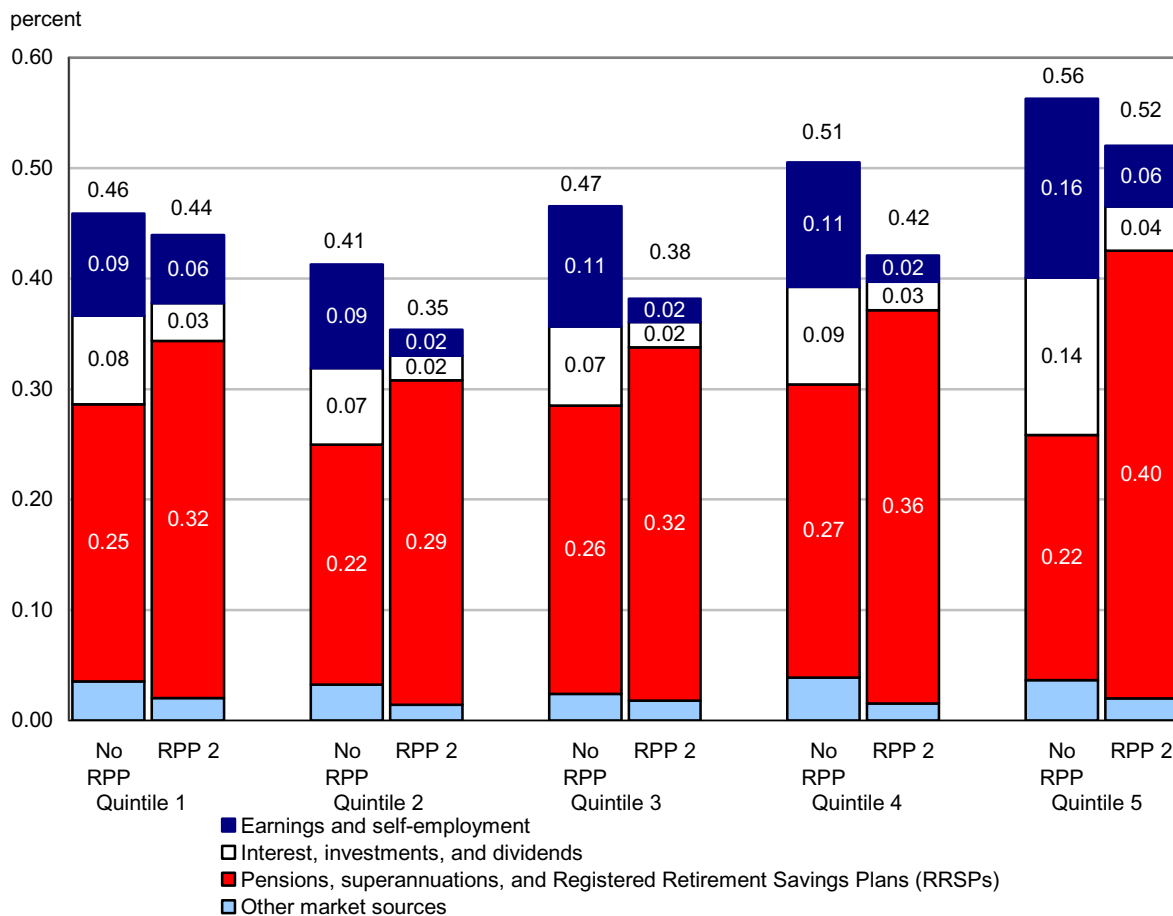
When translated into replacement rates, the profile of market income of RPP members and non-members in 2006 looks quite different (Chart 2). The share of 1989-1991 earnings 'replaced' by RRSPs, pensions and superannuations was 6 to 18 percentage points higher among RPP members, while the share of 1989-1991 earnings 'replaced' by interest, investments and dividends was 5 to 10 percentage points lower. The different extent to which RPP members and non-members were engaged in paid employment in 2006 was also evident, as earnings in that year (expressed as a percentage of earnings in 1989 to 1991) were seven to nine percentage points lower among RPP members than non-members in most quintiles.¹³

12. Average income received directly from RRSPs was somewhat higher among RPP non-members in Q5, at almost \$1,700.

13. Earnings in 2006 are defined as wages and salaries, net income from self-employment, limited partnership income, and other employment income.

Chart 2

Men aged 70 to 72: Market income received in 2006 as a percent of average annual earnings in 1989 to 1991, by Registered Pension Plan (RPP) status



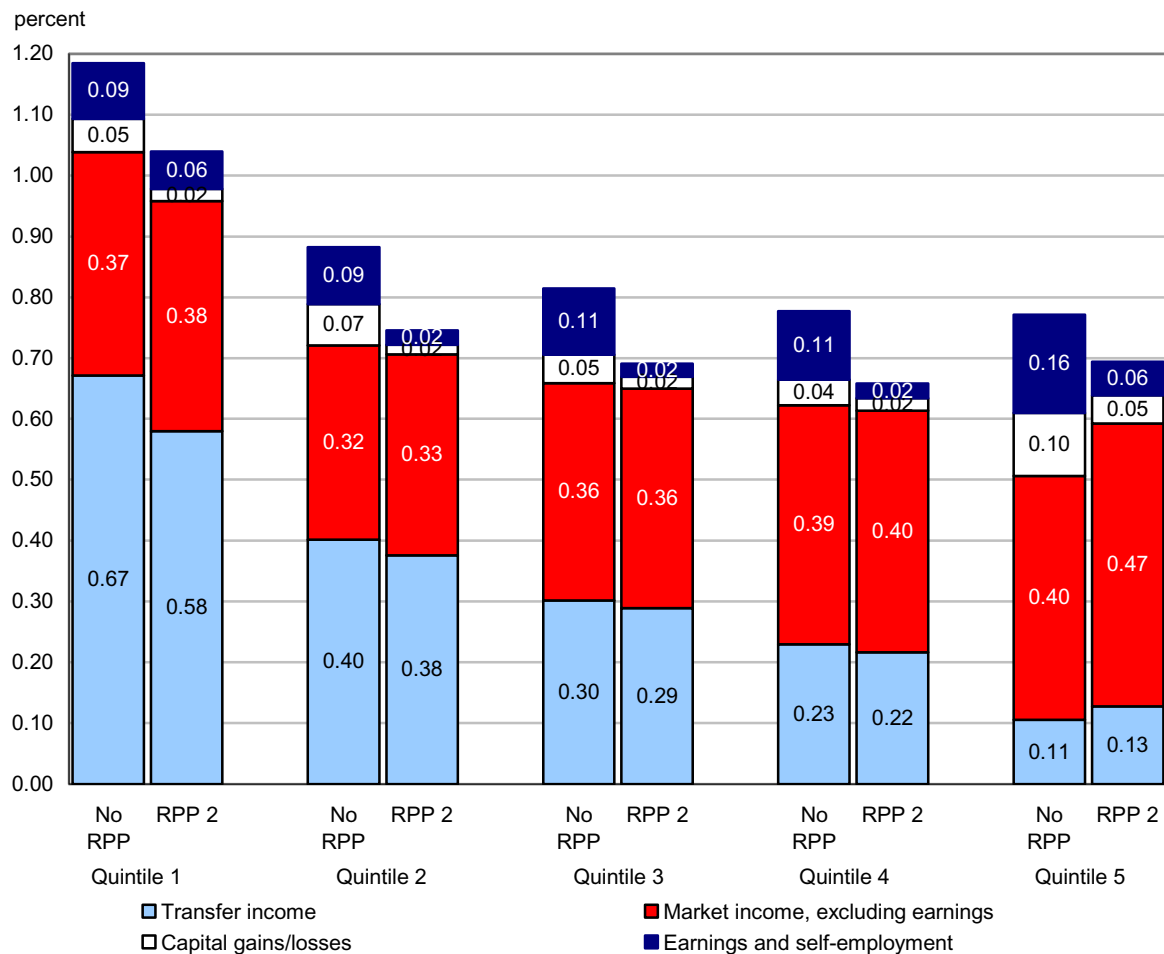
Notes: 'No RPP' means that no Registered Pension Plan income was received in 1991 and 1992. 'RPP 2' means that a Registered Pension Plan income was received in both 1991 and 1992.

In theory, replacement rates imply the substitution of earnings with alternative sources of income in old age, and employed individuals would be excluded from a strict application of the concept. Excluding earnings from the replacement rate calculation is a useful exercise in this light. As shown in Chart 3, the other three sources of market income 'replaced' 32% to 40% of the earnings of men in Q1 to Q4, with a difference of one percentage point between RPP members and non-members in these quintiles. This suggests that, while receipt of earnings (and hence retirement status) is correlated with RPP coverage, comparable earnings replacement rates are achieved by RPP members and non-members who no longer work for pay. This hypothesis is scrutinized more closely in the next section of the paper.

Net capital gains or losses incurred through the disposition of assets were not included in the definition of market income used above. To round out the income profile of men in the cohort, Chart 3 shows capital gains in 2006 as a proportion of earnings received in 1989-1991, as well as 2006 market income and transfer income. Within Q1 to Q4, capital gains in 2006 ranged from \$500 to \$2,800 and were \$700 to \$1,400 higher among RPP non-members than members in those quintiles. When expressed as a proportion of 1989-1991 earnings, this resulted in a difference of two to five percentage points in earnings replacement rates.

Chart 3

Men aged 70 to 72: Total income received in 2006 as a percent of average annual earnings in 1989 to 1991, by Registered Pension Plan (RPP) status



Notes: 'No RPP' means that no Registered Pension Plan income was received in 1991 and 1992. 'RPP 2' means that a Registered Pension Plan income was received in both 1991 and 1992.

Women

Descriptive information on the financial characteristics of women tells much the same story as that for men. As with men, RPP coverage was positively correlated with earnings, with 10% of women in Q1 having a pension in 1991 and 1992 compared with 49% in Q3 and 70% in Q5 (Table 4). The minimum earnings thresholds for each quintile and average annual earnings within quintiles were lower for women than for men; however, within quintiles, average earnings received by RPP members and non-members generally differed by \$100 to \$900. Q5 was the one exception.

Including income from government transfers in 2006, the average total amounts received by RPP members and non-members generally ranged from about \$12,500 to \$14,500 among the women in the sample.¹⁴ Within each quintile, the average amount received by RPP members and non-members differed by a few hundred dollars at most and, when translated into proportions of 1989-1991 earnings, played a similar role with regard to replacement rates. Indeed, the average shares

14. As with men, the incidence of GIS/NFS receipt in 2006 was 8 to 12 percentage points higher among women who did not have RPP coverage than among those who did (see Appendix Table 1).

of earnings replaced by government transfers differed by one percentage point among women in Q2 to Q4, and by four to five percentage points among those in Q1 and Q5 (Chart 4).

Table 4
Transfer income received by women in 2006, by 1989-to-1991 earnings quintile and Registered Pension Plan (RPP) status

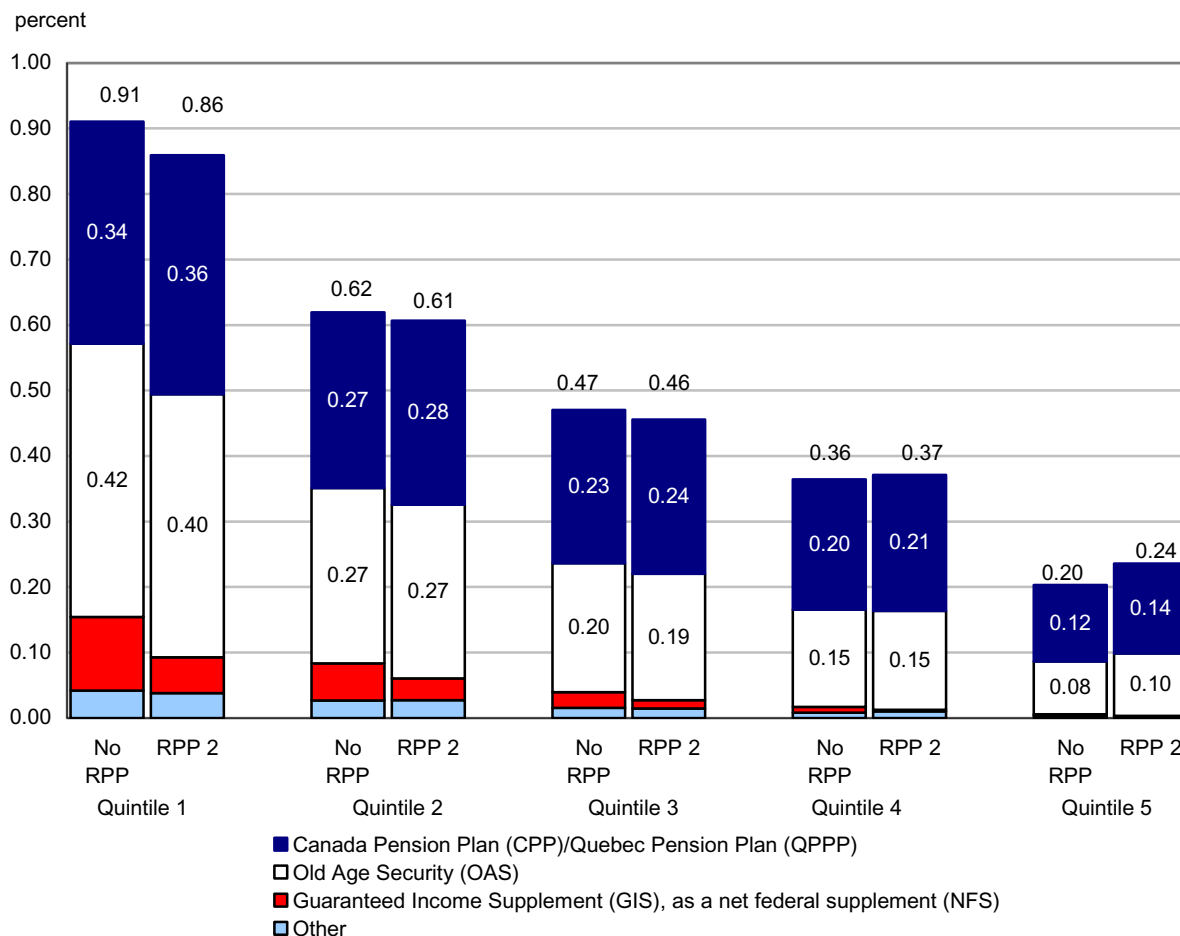
	Quintile 1	Quintile 2	Quintile3	Quintile 4	Quintile 5
Lower bound of earnings quintile	10,000	17,650	25,800	34,350	46,000
			dollars		
			percent		
Pension coverage 1991 to 1992					
No PA in 1991 or 1992	85.2	69.1	42.6	29.6	21.2
PA in either 1991 or 1992	4.6	7.5	8.7	8.3	8.6
PA in both 1991 and 1992	10.2	23.4	48.7	62.1	70.2
Total	100.0	100.0	100.0	100.0	100.0
			dollars		
Average annual earnings (1989 to 1991)					
No PA in 1991 or 1992	13,750	21,450	29,650	39,250	71,850
PA in either 1991 or 1992	13,850	21,900	30,050	39,700	59,550
PA in both 1991 and 1992	14,600	22,050	30,550	39,400	62,050
Average income from Guaranteed Income Supplement (GIS), as a net federal supplement (NFS) (2006)					
No PA in 1991 or 1992	1,550	1,200	700	350	150
PA in either 1991 or 1992	1,050	750	550	200	100
PA in both 1991 and 1992	800	750	400	100	0
Average income from Old Age Security (OAS) (2006)					
No PA in 1991 or 1992	5,750	5,750	5,850	5,850	5,750
PA in either 1991 or 1992	5,900	5,850	5,850	5,900	5,950
PA in both 1991 and 1992	5,850	5,850	5,900	5,900	5,900
Average income from Canada Pension Plan (CPP)/Quebec Pension Plan (QPP) (2006)					
No PA in 1991 or 1992	4,650	5,750	6,950	7,800	8,350
PA in either 1991 or 1992	5,400	6,000	7,200	7,900	8,200
PA in both 1991 and 1992	5,350	6,200	7,200	8,200	8,550
Average income from other transfers (2006)					
No PA in 1991 or 1992	600	600	450	300	300
PA in either 1991 or 1992	550	700	550	350	250
PA in both 1991 and 1992	550	600	400	450	200
Average total transfer income (2006)					
No PA in 1991 or 1992	12,550	13,300	13,950	14,300	14,550
PA in either 1991 or 1992	12,900	13,300	14,150	14,350	14,500
PA in both 1991 and 1992	12,550	13,400	13,900	14,650	14,650

Notes: All dollar amounts have been rounded to the nearest \$50 and are expressed in constant 2007 dollars. PA stands for *pension adjustment*. All tax filers are included in the calculation of average amounts regardless of whether they received income from the source.

Source: Statistics Canada, Longitudinal Administrative Data (LAD).

Chart 4

Women aged 70 to 72: Transfer income received in 2006 as a percent of average annual earnings in 1989 to 1991, by Registered Pension Plan (RPP) status



Notes: 'No RPP' means that no Registered Pension Plan income was received in 1991 and 1992. 'RPP 2' means that a Registered Pension Plan income was received in both 1991 and 1992.

Including market income, earnings received in 2006 again varied noticeably both within and across quintiles. *Within* quintiles, average earnings in 2006 were considerably lower among RPP members than non-members, with this difference ranging from about \$1,000 to \$3,700 among women in Q2 to Q4.

Again, women who were RPP members received more income, on average, from pensions and superannuations than those who were not members. This difference ranged from \$1,100 to \$2,100 within Q2, Q3, and Q4, and from \$2,800 to \$5,300 in Q1 and Q5 respectively. However, average incomes from other market sources, most notably interest, investments, and dividends, were significantly lower among RPP members than non-members.

Table 5
Average market income received by women in 2006, by 1989-to-1991 earnings quintile and Registered Pension Plan (RPP) status

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
	dollars				
Average earnings (2006)					
No PA in 1991 or 1992	1,000	1,600	2,600	4,500	10,950
PA in either 1991 or 1992	900	600	1,100	650	1,600
PA in both 1991 and 1992	400	650	1,000	850	1,850
Average net self-employment income (2006)					
No PA in 1991 or 1992	100	100	200	200	1,200
PA in either 1991 or 1992	50	0	150	100	200
PA in both 1991 and 1992	100	50	50	50	150
Average Registered Retirement Savings Plan (RRSP) income (2006)					
No PA in 1991 or 1992	200	200	400	450	500
PA in either 1991 or 1992	200	250	350	450	650
PA in both 1991 and 1992	500	500	300	400	550
Average pension and superannuation income (2006)					
No PA in 1991 or 1992	4,550	5,800	8,250	13,550	23,350
PA in either 1991 or 1992	5,750	7,600	9,850	14,300	26,450
PA in both 1991 and 1992	7,350	7,900	10,150	14,650	28,600
Average income from interest, investments, and dividends (2006)					
No PA in 1991 or 1992	1,900	2,300	3,400	4,500	11,450
PA in either 1991 or 1992	1,450	1,650	2,250	2,350	4,150
PA in both 1991 and 1992	1,600	1,500	1,500	2,050	3,250
Average income from other market sources (2006)					
No PA in 1991 or 1992	800	1,500	1,200	4,450	3,800
PA in either 1991 or 1992	900	850	650	1,400	1,750
PA in both 1991 and 1992	600	1,250	800	1,050	1,950
Average total market income (2006)					
No PA in 1991 or 1992	8,550	11,500	16,050	27,700	51,250
PA in either 1991 or 1992	9,300	11,150	14,250	19,200	34,800
PA in both 1991 and 1992	10,600	11,750	13,850	19,000	36,350

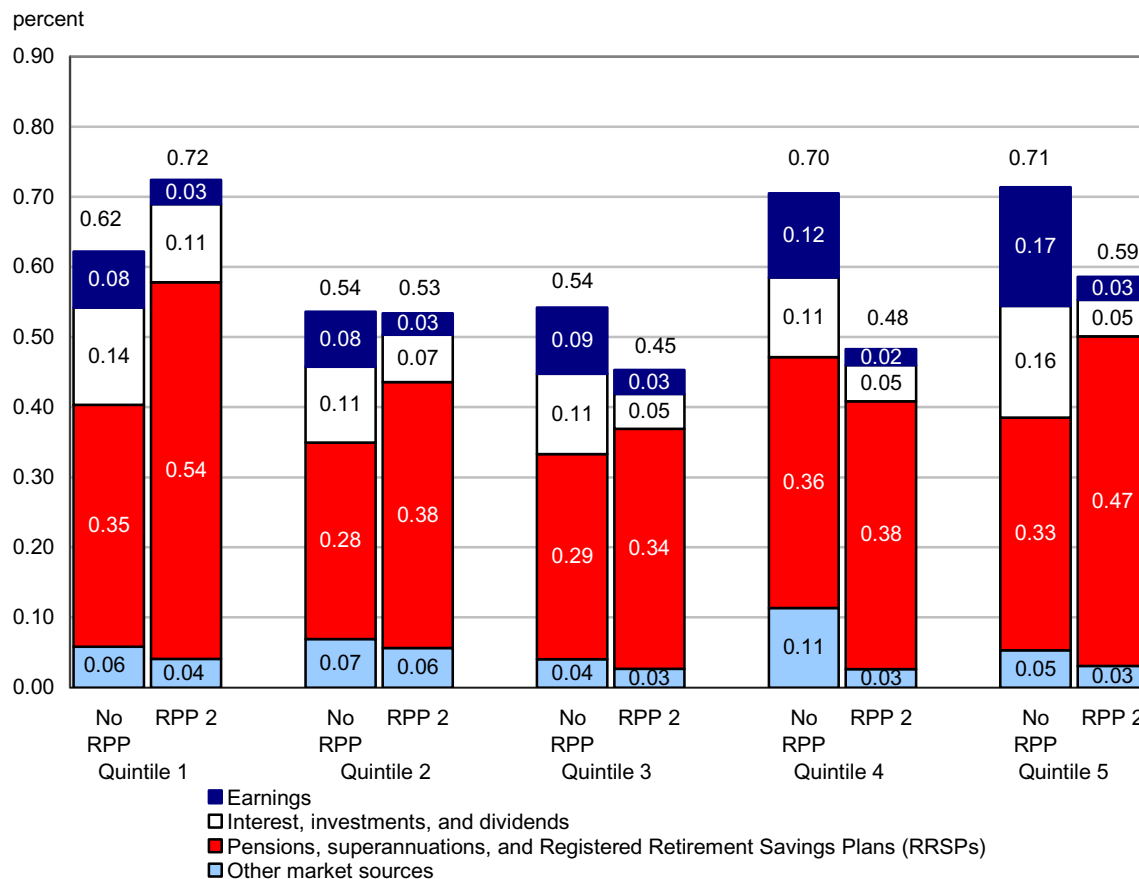
Notes: All dollar amounts have been rounded to the nearest \$50 and are expressed in constant 2007 dollars. PA stands for *pension adjustment*. All tax filers are included in the calculation of average amounts regardless of whether they received income from the source.

Source: Statistics Canada, Longitudinal Administrative Data (LAD)

These differences are reflected in the earnings replacement outcomes experienced by RPP members and non-members (Chart 5). Among RPP members in Q2 to Q4, RRSPs, pensions and superannuations in 2006 accounted for 34% to 38% of their 1989-1991 earnings, while the proportions were 2 to 10 percentage points lower among RPP non-members. However, market income from other sources offset much of this difference.

Chart 5

Women aged 70 to 72: Market income received in 2006 as a percent of average annual earnings in 1989 to 1991, by Registered Pension Plan (RPP) status

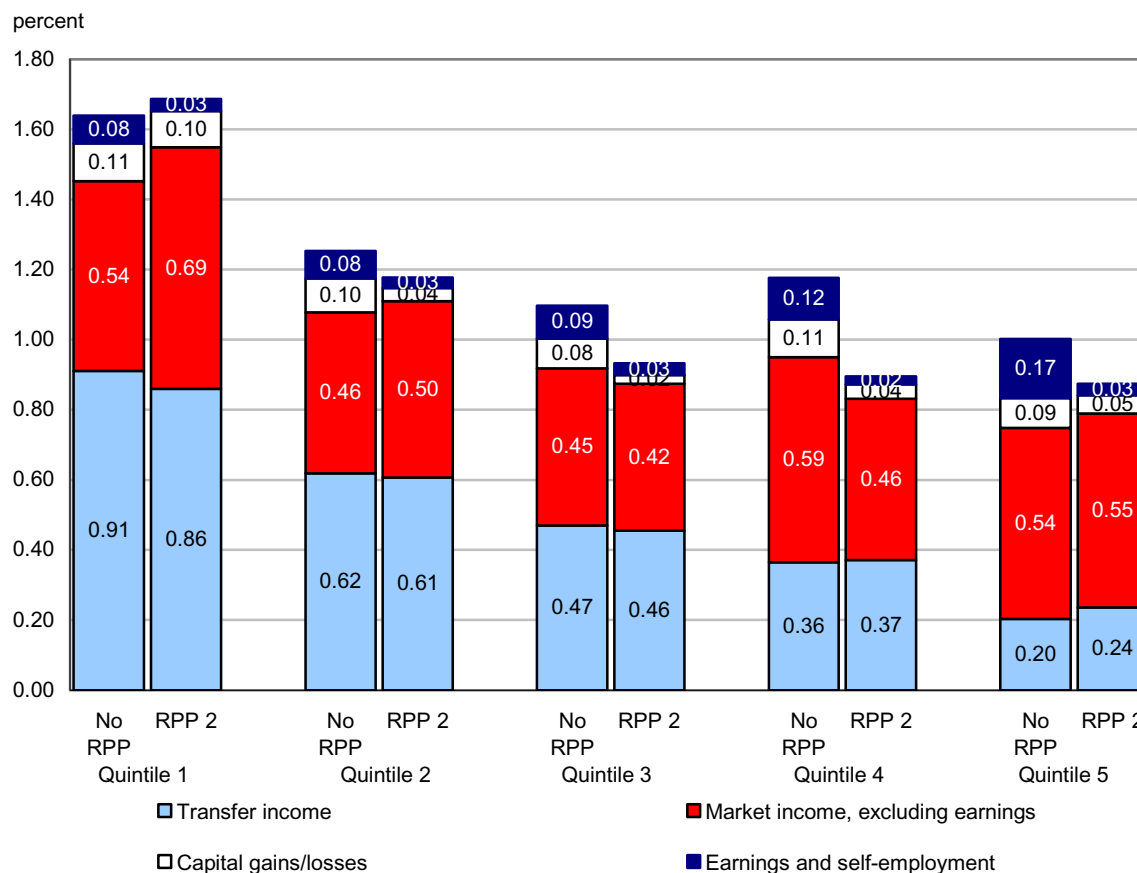


Notes: 'No RPP' means that no Registered Pension Plan income was received in 1991 and 1992. 'RPP 2' means that a Registered Pension Plan income was received in both 1991 and 1992.

Finally, adding net capital gains into the picture (Chart 6), average amounts were \$1,300 to \$2,600 higher among RPP non-members than RPP members in Q2 to Q4, and this translated into a larger proportion of 1989-1991 earnings.

Chart 6

Women aged 70 to 72: Total income received in 2006 as a percent of average annual earnings 1989-1991, by RPP status



Notes: 'No RPP' means that no Registered Pension Plan income was received in 1991 and 1992. 'RPP 2' means that a Registered Pension Plan income was received in both 1991 and 1992.

4 Multivariate results

Thus far, we have examined the financial characteristics of the tax filers using group averages. The differences in average earnings in 2006 of RPP members and non-members certainly stand out and testify to the importance of taking labour force status into account in the analysis of replacement rates. Towards this end, two sets of multivariate models are presented. The first is a probit model that identifies the factors—including RPP coverage—significantly correlated with being retired at age 70 to 72. The second is an OLS regression model that estimates the strength of the correlation between a set of characteristics and the replacement rates achieved by *retired* individuals.

Retirement status

The LAD does not include a retirement variable; hence, it is necessary to construct one based on the financial characteristics of tax filers. To do so, tax filers in the sample are identified as retirees if their earnings in 2006 were less than 10% of their average annual earnings over the 1989-1991 period. This definition allows for the possibility that retirees may maintain some limited involvement in the paid workforce.

In terms of the independent variables included in the multivariate models, the LAD contains detailed information on the financial characteristics of tax filers but far less information on their demographic and employment characteristics. Consequently, the multivariate models include a fairly limited set of independent variables.

In terms of demographic characteristics, tax filers who became landed immigrants in Canada between 1980 and 1991 can be identified on the LAD while those who became landed immigrants prior to 1980 cannot. A variable identifying these '1980-1991 immigrants' is included in the model, with persons born in Canada and immigrants landing prior to 1980 used as the reference group.¹⁵ Immigrants identified in our sample would have been at least 44 to 46 years of age at landing and hence had less time than individuals born in Canada or earlier immigrants to contribute to the CPP/QPP or to RPPs during their working lives. The calculation of OAS benefits also takes years of residence in Canada into account. For these reasons, we expect the '1980-1991 immigrants' to have lower replacement rates than the reference group and to have a lower likelihood of being retired at age 70 to 72.¹⁶

Marital status is available on each year of the LAD, and, over the 1991-to-2006 period, individuals may have moved through several marital states. Family formation and dissolution have important implications for financial well-being in old age and consequently warrant in-depth analysis. However, such analysis is beyond the scope of this paper; instead, we include a simplified set of dummy variables that capture the marital status of tax filers at the beginning and end of the reference period. Our categories include individuals who were: (i) married to the same person in 1991 and 2006; (ii) married in 1991 and separated/divorced in 2006; (iii) married in 1991 and widowed in 2006; and (iv) all other combinations. Relative to individuals who were married at both points in time, individuals who were widowed (and did not re-marry) are expected to have higher earnings replacement rates since they may receive pension benefits and retirement savings accrued by their spouse. We do not have *a priori* expectations regarding the other marital categories.

Although separate regression models are run for individuals in each pre-retirement earnings quintile, it is still possible that replacement rates vary across the earnings distribution *within* each quintile. Within the bottom quintile, for example, individuals from the low end of the distribution may be more likely to qualify for income-tested retirement benefits, such as the GIS, than individuals from the top. Average earnings in 1989-1991 (measured in \$000s) are thus included in the models with the expectation that they will be negatively correlated with replacement rates.

15. Readers are reminded that the sample is restricted to individuals who filed a tax return and had positive earnings in 1989, 1990, and 1991, inclusive. Immigrants who landed in Canada between 1989 and 1991 but did not meet these criteria are excluded.

16. A more detailed set of immigration categories—distinguishing between immigrants who arrived in the first half of the 1980s and those who arrived in the second half—was tried in the models. However, this resulted in too few cases in several of the quintile-specific models, and the broader grouping was used.

Finally, a variable identifying whether or not individuals had RPP coverage in 1991 or 1992 is included. This variable is expected to be positively correlated with both the likelihood of being retired and with the replacement rates achieved by retirees.

Probit models were run for each earnings quintile and separately for men and women. Complete results are shown in Appendix Table 1. Of the four independent variables included in the models, RPP status is the only one consistently and strongly correlated with retirement status. The strength of the correlation is illustrated in Table 6, which shows the predicted probability of retirement and how much this probability varies according to RPP status. The base predicted probability is calculated for an individual who was married at both the beginning and end of the reference period, was born in Canada or immigrated prior to 1980, had earnings in 1989-1991 that were the average for the quintile, and did not have RPP coverage in either 1991 or 1992. Based on these characteristics, the predicted probability of a male in Q3 being retired in 2006 was 85%. This probability increases by 10.7 percentage points if he was assumed to have RPP coverage in both 1991 and 1992. Overall, among men, RPP coverage increases the predicted probability of being retired by 4 percentage points in Q1, by 10 percentage points in Q3, and by 14 percentage points in Q5. Likewise, for women, the predicted probability of being retired was 3 to 15 percentage points higher among RPP members than non-members across quintiles.

Table 6
Likelihood of being retired: Marginal effects associated with Registered Pension Plan (RPP) coverage

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
	percent				
Men					
Predicted probabilities of being retired	89.5	87.2	84.8	83.9	79.1
	percentage points				
Marginal effect associated with RPP coverage					
RPP coverage in 1991 and 1992*					
Neither year (reference group)	...	...	...	...	...
One year	4.7 ***	7.0 ***	9.6 ***	11.1 ***	14.1 ***
Both years	3.6 ***	8.2 ***	10.7 ***	11.1 ***	14.4 ***
	percent				
Women					
Predicted probabilities of being retired	91.3	90.0	87.4	84.1	78.6
	percentage points				
Marginal effect associated with RPP coverage					
RPP coverage in 1991 and 1992*					
Neither year (reference group)	...	...	...	...	...
One year	2.9 †	6.0 ***	5.3 ***	12.8 ***	15.5 ***
Both years	4.8 ***	5.5 ***	8.0 ***	11.8 ***	15.3 ***

† p<0.1

* p<0.05

** p<0.01

*** p<0.001

Note: Predicted probabilities calculated on the basis of mean pre-retirement earnings, married at the beginning and end of the reference period, no RPP coverage in 1991 and 1992, and being Canadian-born or immigrant landed before 1980.

To assess the robustness of these findings, the same probit models were run for the years 2003, 2004 and 2005. The predicted probabilities of being retired, and the marginal effects associated with pension coverage, are shown for 2003 to 2006 in Appendix Charts 1 to 6. Considering men

from Q3, the predicted probability of an RPP member being retired ranged from 92% in 2003 to 95% in 2006, while the predicted probability of an RPP non-member being retired increased from 77% to 85% over the same period (Appendix Chart 2). Overall, the vast majority of RPP members (90% or more) were retired by 2003, while RPP non-members were more likely to defer retirement to later years and older ages. Their reasons for doing so cannot be discerned from the LAD.

Replacement rates

OLS regression models were subsequently run for retired tax filers. Again, separate models were run for each quintile; this allowed the correlations between the independent variables and replacement rates to be estimated at different points across the earnings distribution. In addition to the independent variables included in the models presented above, a 'years since retirement' variable was also included. It was defined as the number of years since the individual tax filers' annual earnings first fell below 10% of their 1989-1991 earnings. Our reference group is individuals who have been 'retired' for less than five years, with variables included to identify individuals who have been 'retired' for 5 to 9 years and 10 to 14 years. Arguments for either a positive or negative correlation between years since retirement and replacement rates can be made. On the one hand, individuals who retired 10 to 14 years earlier may have greater financial resources (given that they could afford to retire early) and hence have higher replacement rates at age 70 to 72. On the other hand, those who retired 10 to 14 years earlier may have had more time to deplete their savings and hence lower replacement rates.

The OLS models were run on earnings replacement rates, defined as total income (including capital gains) received in 2006 divided by 1989-1991 earnings. Because the dependent variable is a ratio, regression coefficients can be interpreted as the percentage-point change in the replacement rate associated with each independent variable. Results for men are shown in Table 7.

RPP coverage was *not* consistently correlated with the earnings replacement rates achieved by men in the sample. For men, the correlation was significant and negative in Q2 and significant and positive in Q3 and Q5—but only for men who had RPP coverage in either 1991 or 1992. While RPP status was strongly and consistently correlated with retirement status at age 70 to 72, there was no clear and consistent link with the earnings replacement rates of individuals who had left the labour force.¹⁷

Several other variables in the OLS models are associated with replacement rates. Consistent with expectations, replacement rates were lower among immigrants who landed in Canada between 1980 and 1991 than they were among the rest of the population. The '1980-1991 immigrants' in Q3 and Q4 had replacement rates 17 to 20 percentage points lower than the reference group while immigrants in Q1 had replacement rates over 40 percentage points lower. The correlation between immigration status and replacement rates was negative in Q2 and Q5, but did not reach levels of statistical significance.

There is a strong positive correlation between replacement rates and widowhood, as men who were widowed at the end of the reference period generally had replacement rates 16 to 20 percentage points higher than men who were still married. Receipt of survivor benefits and other retirement savings accrued by the spouse is one possible explanation for this correlation. The

17. The same models were run for the years 2003, 2004 and 2005 and yielded similar results. Of the 20 regressions run for men (five quintiles in each of four years), the relationship between RPP coverage and earnings replacement rates were non-significant in 13 instances, positive and significant in one instance, and negative and significant in six instances.

replacement rates of men who were divorced did not differ significantly from those of men who remained married.

The number of years since retirement is negatively correlated with replacement rates in Q2, Q3, and Q5, as men who had retired 5 to 9 years earlier had replacement rates 7 to 15 percentage points lower than those who had retired within the previous five years (at age 66 or older). A negative correlation between retiring 10 to 14 years earlier and replacement rates is observed in Q3 and Q5. Finally, a negative correlation is observed between replacement rates and 1989-1991 earnings, with this strongest in Q1.

Table 7
Male tax filers who were aged 55 to 57 in 1991: Ordinary Least Squares (OLS)
regression results on ratio of total income (before tax) in 2006 relative to average
annual earnings (before tax) in 1989 to 1991

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
	coefficient	coefficient	coefficient	coefficient	coefficient
Constant	2.399 ***	1.297 ***	1.060 ***	0.69 ***	0.794 ***
Registered Pension Plan (RPP) coverage in 1991 to 1992					
Neither year (reference group)	...	...	...	...	...
One year	0.056	0.002	0.061 *	0.002	0.075 *
Both years	0.008	-0.043 †	-0.002	-0.020	0.003
Immigrated 1980 to 1991					
No (reference group)	...	...	...	...	...
Yes	-0.454 ***	-0.063	-0.195 †	-0.172 †	-0.183
Marital status in 1991/2006					
Married/married (reference group)	...	...	...	...	...
Married/divorced	-0.104	-0.048	-0.055	-0.010	0.043
Married/widowed	0.196 ***	0.337 ***	0.208 ***	0.161 ***	0.188 ***
All other	-0.054 †	-0.001	0.058 *	0.088 ***	0.065 *
Years since 'retirement'					
Less than 5 (reference group)	...	...	...	...	...
5 to 9	-0.054	-0.067 †	-0.128 ***	-0.023	-0.154 ***
10 to 14	0.016	-0.036	-0.082 **	0.001	-0.155 ***
1989 to 1991 earnings (\$000s)	-0.053 ***	-0.012 ***	-0.006 *	-0.001	0.000 *

† p<0.1
 * p<0.05
 ** p<0.01
 *** p<0.001

Results for women are shown in Table 8. The correlation between RPP coverage and replacement rates varies across quintiles, as it is positive and significant in Q1 and negative and significant in Q3 and Q4.¹⁸

As with men, women who immigrated to Canada between 1980 and 1991 had earnings replacement rates below those of the reference group, with the difference ranging from 33 to 55 percentage points in Q1, Q2 and Q3.

18. Again, the results are similar from models run for 2003, 2004 and 2006. Of the twenty regression models run for women, the relationship between RPP coverage and earnings replacement rates were non-significant in 16 instances, and negative and significant in four.

Again, changes in marital status are strongly correlated with replacement rates, as women who were divorced at the end of the reference period had rates significantly higher than those of women who were still married. Moreover, women in several quintiles who were divorced at the end of the reference period had replacement rates higher than those of their married counterparts.

Among women, there is a negative correlation between years since retirement and replacement rates in several quintiles. In addition, as with men, a negative correlation is observed between replacement rates and 1989-1991 earnings among women, with this again strongest in Q1.

Table 8
Female tax filers who were aged 55 to 57 in 1991: Ordinary Least Squares (OLS) regression results on ratio of total income (before tax) in 2006 relative to average annual earnings (before tax) in 1989 to 1991

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
	coefficient	coefficient	coefficient	coefficient	coefficient
Constant	2.816 ***	1.832 ***	1.514 ***	1.293 ***	0.956 ***
Registered Pension Plan (RPP) coverage in 1991 to 1992					
Neither year (reference group)	...	...	...	...	...
One year	0.112	0.007	0.013	-0.155 †	-0.050
Both years	0.158 †	0.006	-0.067 *	-0.192 ***	-0.041
Immigrated 1980 to 1991					
No (reference group)	...	...	...	...	...
Yes	-0.553 ***	-0.370 ***	-0.332 **	-0.263	-0.278
Marital status in 1991/2006					
Married/married (reference group)	...	...	...	...	...
Married/divorced	1.110 ***	0.283 *	0.032	0.394 *	-0.052
Married/widowed	1.067 ***	0.783 ***	0.537 ***	0.653 ***	0.410 ***
All other	0.223 ***	0.091 *	0.051 †	0.039	0.025
Years since 'retirement'					
Less than 5 (reference group)	...	...	...	...	...
5 to 9	-0.301 **	-0.079	-0.090 †	-0.351 ***	-0.072 †
10 to 14	-0.322 ***	-0.084	-0.062	-0.398 ***	-0.118 **
1989 to 1991 earnings (\$000s)	-0.086 ***	-0.035 ***	-0.018 **	0.000	0.000

† p<0.1
 * p<0.05
 ** p<0.01
 *** p<0.001

Predicted replacement rates for individuals with specific characteristics can be estimated from these models. For example, a Canadian-born man with no RPP coverage, who was married over the reference period, who retired between 1997 and 2001, and had average annual earnings of \$40,000 in 1989-1991 is predicted to have an earnings replacement rate of 0.63. A Canadian-born woman with the same characteristics is predicted to have an earnings replacement rate of 0.85.

5 Conclusions and implications

A primary objective of this analysis is to assess the financial characteristics of Canadians who were aged 70 to 72 in 2006, including the extent to which those characteristics differed among individuals who were RPP members, and those who were not, when in their mid-fifties. The steps required to define our sample and distinguish RPP members from non-members testify to the data limitations that remain in this field. Timely and reliable data on the wealth of working-age

Canadians is needed in order to assess their financial preparedness for retirement. This remains a significant information gap and an impediment to research in this area. As a result of these data limitations, our conclusions are based on the replacement rate outcomes of a narrowly defined group of tax filers.

Moreover, the strategy used to identify RPP members—based on two years of pension contributions—likely results in some ‘slippage’. Simply put, RPP non-members may have had years of pension service during their working lives, and this may be one reason that RPP non-members in the sample had average incomes from pensions and superannuations in 2006 that were two-thirds to three-quarters of those of RPP members. Information on years of pensionable service and pension plan characteristics would allow for a more nuanced assessment of financial outcomes. Furthermore, this study is limited to individuals who were aged 70 to 72 in 2006. The economic circumstances faced by this cohort may be different from those faced by other cohorts; consequently, caution should be exercised in extrapolating our findings to the broader population of seniors.

That being said, our analysis indicates that there is a strong correlation between RPP coverage and the likelihood of being retired at age 70 to 72. The strength of this correlation—in the range of 4 to 14 percentage points at age 70 to 72—is considerable. This result is consistent with findings from the 2007 General Social Survey, which show that, among non-retired Canadians aged 45 to 59, those with RPP coverage are significantly more likely than those without coverage to be very certain of their anticipated retirement age and expect to retire 1.1 year sooner (Schellenberg and Ostrovsky 2008). The reasons why RPP non-members in our sample defer retirement to older ages than do RPP members cannot be discerned from our data. It is likely that this is a choice for some, perhaps a preference to keep working, and a necessity for others, perhaps reflecting concerns about retirement savings. But, again, the prevalence of each of these motivations is beyond the scope of our data.

Among tax filers who have retired, the replacement rates achieved by RPP members and non-members in the sample are not all that different. This conclusion—drawn from the results of our multivariate models—is consistent with the descriptive information presented earlier. More specifically, while individuals who did not have RPP coverage received less income from pensions and superannuations at age 70 to 72 than did individuals with coverage, this difference was offset by income received from other market sources, most notably interest, investments, and dividends, and capital gains.

Other results from the analysis also stand out—the lower replacement rates among immigrants who landed in Canada between 1980 and 1991 being among these. It is important to underscore the fact that these individuals were at least 44 years of age when they landed in Canada, and hence had far less time than others in the broader population to contribute to RPPs or to the CPP/QPP, or to accumulate savings through other means. Lower replacement rates are to be expected in this context. Moreover, the data source used for this analysis does not provide information on assets that immigrants may own in other countries.

The results of the analysis also indicate that late-life changes in marital status have important implications for financial outcomes in old age. More detailed analysis of this topic is warranted. Other areas for further research include the self-employed. This group makes up a meaningful share of employed Canadians who do not have pension coverage, and little is known about how they fare financially in their later years. The relationship between pension coverage and financial outcomes in old age could also be examined with couples rather than individuals as the unit of analysis.

Appendix

Appendix Table 1

Percent of men and women receiving the Guaranteed Income Supplement/Net Federal Supplement in 2006, by 1989-to-1991 earnings quintile, Registered Pension (RPP) status, and sex

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
	percent				
Men					
Pension coverage 1991 to 1992					
No PA in 1991 or 1992	54.3	38.1	27.0	16.7	5.4
PA in either 1991 or 1992	46.0	27.6	14.7	7.3	2.5
PA in both 1991 and 1992	46.8	25.6	16.0	7.3	2.8
Women					
Pension coverage 1991 to 1992					
No PA in 1991 or 1992	42.4	37.0	27.0	16.7	5.4
PA in either 1991 or 1992	32.6	30.1	14.7	7.3	2.5
PA in both 1991 and 1992	30.2	29.5	16.0	7.3	2.8

Notes: All dollar amounts have been rounded to the nearest \$50 and are expressed in constant 2007 dollars. PA stands for *pension adjustment*.

Source: Statistics Canada, Longitudinal Administrative Data (LAD).

Appendix Table 2
Probit results on likelihood of being retired men aged 70 to 72 in 2006, by pre-retirement earnings quintiles

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Men					
Registered Pension Plan (RPP) coverage in 1991 and 1992					
Neither year (reference group)	...	...	...	...	...
One year	0.317 ***	0.437 ***	0.563 ***	0.659 ***	0.679 ***
Both years	0.229 ***	0.547 ***	0.663 ***	0.653 ***	0.702 ***
Immigrated 1980 to 1991					
No (reference group)	...	...	...	...	...
Yes	0.228 *	0.301	-0.267	0.066	-0.533 **
Marital status in 1991/2006					
Married/married (reference group)	...	...	...	...	...
Married/divorced	-0.307 **	-0.021	-0.107	-0.116	-0.133
Married/widowed	0.031	0.170	0.010	0.263 *	0.247 *
All other	-0.122 *	0.037	0.063	-0.051	-0.164 **
Permanent earnings (\$000s)	-0.007 *	0.005	-0.014 *	-0.002	0.000 ***
Constant	1.425 ***	0.923 ***	1.761 ***	1.095 ***	0.858 ***
Women					
RPP coverage in 1991 and 1992					
Neither year (reference group)	...	...	...	...	...
One year	0.212	0.470 ***	0.307 **	0.866 ***	0.769 ***
Both years	0.405 ***	0.413 ***	0.539 ***	0.740 ***	0.750 ***
Immigrated 1980 to 1991					
No (reference group)	...	...	...	...	...
Yes	0.610 *	0.052	0.177	-0.759 **	0.553
Marital status in 1991/2006					
Married/married (reference group)	...	...	...	...	...
Married/divorced	0.474	-0.120	0.158	-0.304	0.087
Married/widowed	0.226 **	0.008	0.135	0.032	0.082
All other	0.183 **	0.027	0.054	-0.018	0.126
Permanent earnings (\$000s)	-0.037 **	-0.025 *	0.014	-0.014	-0.002 ***
Constant	1.875 ***	1.815 ***	0.724	1.513 ***	0.949 ***

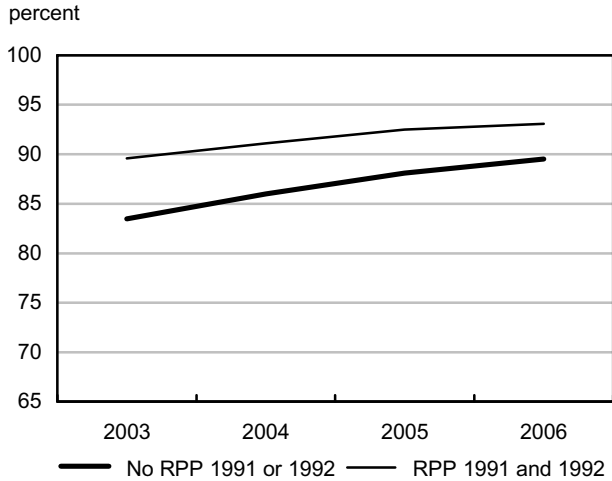
* p<0.05

** p<0.01

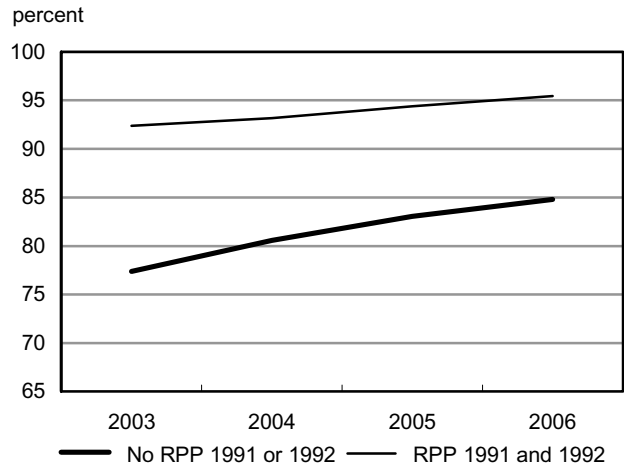
*** p<0.001

Source: Statistics Canada, Longitudinal Administrative Data (LAD).

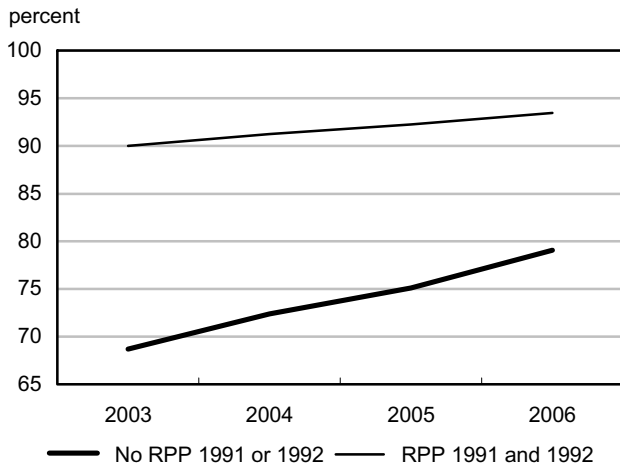
Appendix Chart 1 – Men in 1st pre-retirement earnings quintile: Predicted probability of being 'retired', by RPP status in 1991-1992



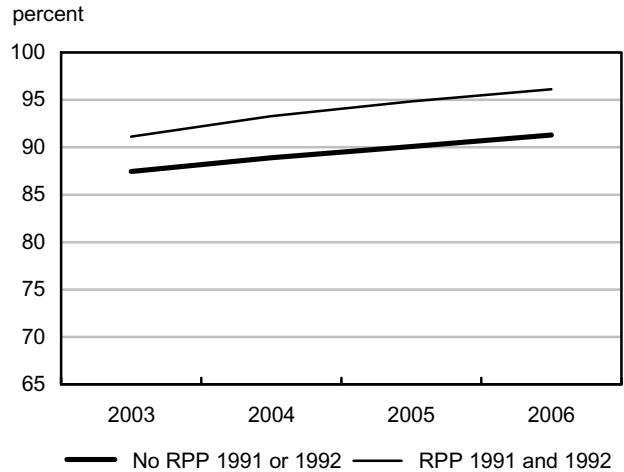
Appendix Chart 2 – Men in 3rd pre-retirement earnings quintile: Predicted probability of being 'retired', by RPP status in 1991-1992



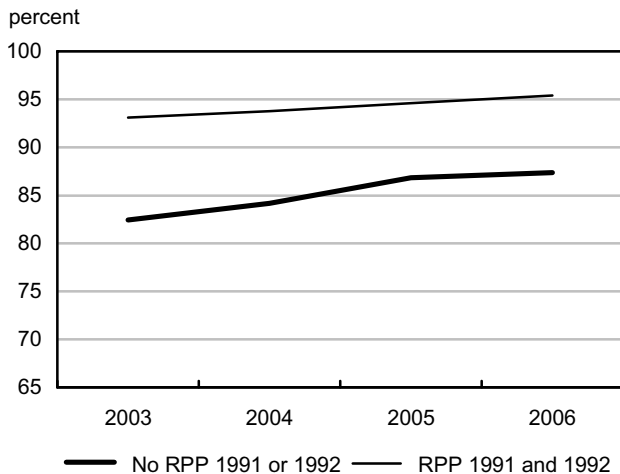
Appendix Chart 3 – Men in 5th pre-retirement earnings quintile: Predicted probability of being 'retired', by RPP status in 1991-1992



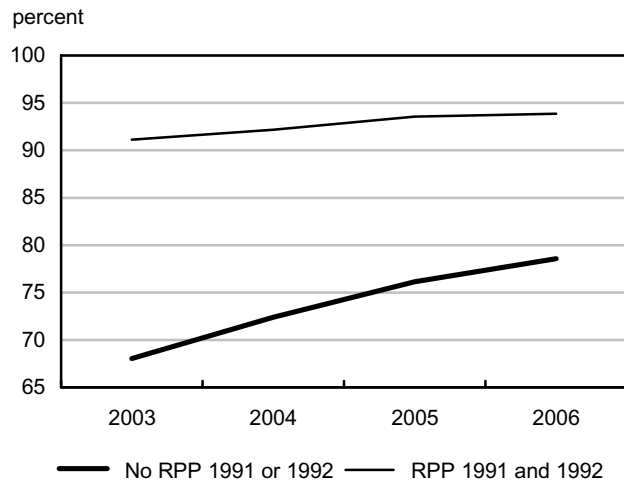
Appendix Chart 4 – Women in 1st pre-retirement earnings quintile: Predicted probability of being 'retired', by RPP status in 1991-1992



Appendix Chart 5 – Women in 3rd pre-retirement earnings quintile: Predicted probability of being 'retired', by RPP status in 1991-1992



Appendix Chart 6 – Women in 5th pre-retirement earnings quintile: Predicted probability of being 'retired', by RPP status in 1991-1992



References

Horner, Keith. 2007. *Emerging Challenges and Policy Responses within Canada's Retirement Income System: A Focus on Workplace Pensions, Private Savings and Income Security*. Ottawa: Strategic Policy and Research Branch, Human Resources and Social Development Canada.

LaRochelle-Côté, Sébastien, Garnett Picot, and John Myles. 2007. *Income Security and Stability during Retirement in Canada*. Analytical Studies Research Paper Series. Catalogue no. 11F0019MIE2008306. Ottawa: Statistics Canada.

Morissette, René, and Yuri Ostrovsky. 2006. "Pension coverage and retirement savings of Canadian families, 1986 to 2003." Analytical Studies Research Paper Series. Catalogue no. 11F0019MIE2006286. Ottawa: Statistics Canada.

Schellenberg, Grant, and Yuri Ostrovsky. 2008. "2007 General Social Survey Report: The retirement plans and expectations of older workers." *Canadian Social Trends*. Winter 2008, No. 86. Catalogue no. 11-008. Ottawa: Statistics Canada.

Smith, James P. 2003. "Trends and projections in income replacement during retirement." *Journal of Labor Economics*. 21, 4: 755-781.