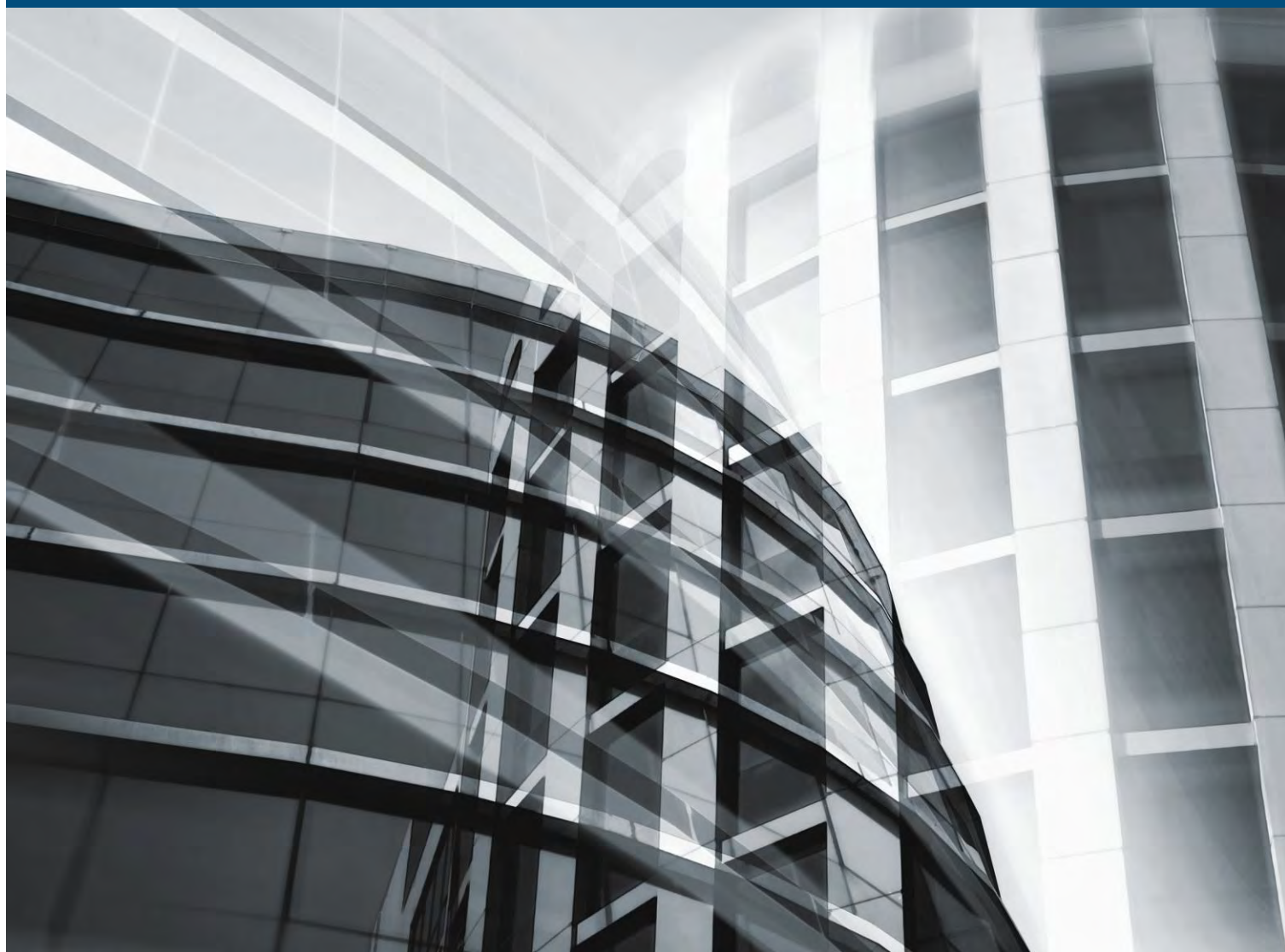# New CPP Enhancements: What do they mean for Canadian workers and seniors?

New CPP Enhancements
What do they mean for Canadian workers and seniors?

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SECTION 1: EXECUTIVE SUMMARY

Within Canada's complex tax and social benefit system, how much of the enhanced Canada Pension Plan (CPP) benefit will make its way into the pockets of Canadian seniors and improve their financial well-being?

At this point, research on the impact of the CPP enhancements on retirement financial outcomes for future Canadian seniors has been limited. It has been unclear how much the enhancements will improve the retirement preparedness of Canadians in general—let alone vulnerable groups, such as those without workplace pensions. There has also been concern that, because of the income test involved in the Guaranteed Income Supplement (GIS) benefit calculation, the enhancements will ultimately do very little to help low-income Canadians in retirement, while adding to their financial burden during their working lives with higher levels of involuntary CPP contributions.

This study addresses these and other questions. It finds that the CPP enhancements will noticeably improve the retirement income adequacy of Canadians without workplace pensions. The results also suggest that the CPP enhancements offer net benefits that are reasonably comparable (as a proportion of the total benefit) across Canadians with different lifetime earnings levels.

A note of caution: projections are a critical part of policy analysis, but they are not predictions. The results of this study are best considered as a reasonable view of the future, based on what is known today, to better understand the dynamics of the Canadian retirement income system and promote informed, engaged discussion on how best to move forward.

Key Findings

Building on Statistics Canada's *LifePaths* population microsimulation model, this study looks out to the year 2070, when the CPP enhancements will be fully mature, and calculates two distinct impacts: (1) the net impact on Canadian seniors' income flows, and (2) how well they help to support the working-life living standards of Canadians in retirement.

Following the first line of investigation, the study found that the proportion of the enhanced CPP benefit that will make its way into the pockets of Canadian seniors was reasonably consistent across earnings groups—but the dynamics vary greatly. As anticipated, the enhanced CPP benefit for low-earning workers will be offset by reduced GIS benefits and higher taxes, which will decrease the average net income from the CPP enhancements by 42% (from $3,600 to $2,100 in 2017 dollars). On the other end of the spectrum, high-earning workers will lose nearly the same proportion due to higher taxes and lost OAS benefits (a 41% reduction to the mean gross benefit of $13,500, resulting in a net benefit of $8,000). Lower-middle income earners get the most net value from the CPP enhancements but still lose 34% (reducing the benefit from $7,700 to $5,100) due to lost GIS and OAS benefits, as well as higher taxes.

Given Canada's progressive taxation policies, perhaps income tax implications should not be considered when assessing fairness. But when they are included, the results show roughly similar proportional net benefits across earning groups—suggesting there is no fundamental flaw in the CPP enhancements that excessively penalizes lower-income Canadians during the payout stage. Whether these proportions are acceptable, however, is open to discussion.

Despite this general consistency, the results also point to the importance of carefully designing the expanded Working Income Tax Benefit (WITB). For instance, it should be taken into consideration that low-income Canadians will likely receive benefits over a shorter period (due to lower life expectancy). In addition, the relative "pain" of the involuntary additional CPP contribution (2 percent of pay) may be higher for them than for high-earning workers. This is particularly true for self-employed low-earning workers, who are obliged to pay both the employer and the employee side of the enhanced contribution. Moreover, the tax deductibility of the enhanced contribution carries more value for a high earner than a low earner. These conclusions all point to the critical role of properly designing the WITB and possibly other refundable tax credit designs, making it an important subject for further analysis. Moreover, these findings do not negate the potential importance of reevaluating the GIS program, which currently creates a significant disincentive for low-income Canadians to work past age 65 and to save for retirement through registered vehicles.

Understanding the "net impact" of the CPP enhancements on Canadians at different earning levels should ideally capture the tradeoffs occurring in both the pay-in and payout stages—including the relative benefit high-earners gain from the CPP enhancement's tax deductibility during the contribution stage, compared with potentially higher taxes in the payout stage. It also becomes relevant when incorporating possible behavioural responses, such as a decline in personal savings and employer pension plan income, with lower contributions leading to lower benefits. Capturing these tradeoffs could be done by computing the net "rate of return" that workers with varying earning histories receive on the enhanced CPP contributions. This is also an area for future research.

The second line of investigation found the CPP enhancements should help Canadians maintain their working-life living standards after retirement—particularly middle- and upper-earners who do not have significant participation in employer pension plans during their working lives (40% of the Canadian population). When the CPP enhancements are factored in, and assuming no other changes, the proportion of this group considered unprepared for retirement drops from 46% to 34%. This improvement is a positive outcome, given that this group was likely an important motivator behind the enhancements.

Canadians who generally fall below the poverty line during their working lives were predominantly found to have elevated living standards after retirement—with or without the CPP enhancements. Further analysis of poverty outcomes should be carried out to inform policy designs (such as the optimal level of WITB) that address the needs and risks of financially vulnerable Canadians. In addition, this analysis does not incorporate offsets from provincial income supplements and other subsidies for low-income seniors, which can be substantial in some provinces.

Implications and Next Steps

While the results are generally positive, concerns over retirement adequacy remain. One issue is that the CPP enhancements may push some Canadians to become overly prepared for retirement (defined as having 20% more net income available to spend in retirement relative to before retirement), unnecessarily reducing their living standards during their working lives because of the new contributions. For example, while 11% of higher-middle earners will no longer be considered inadequately prepared for retirement, 11% will become overly prepared on account of the enhancements.

However, if already-prepared Canadians reduce their voluntary personal savings elsewhere, this will help the CPP enhancements achieve a more targeted impact. Following the example of countries like Sweden, Holland and the U.K., the Canadian government can create initiatives to create central registries that will keep Canadians more informed about their expected retirement income so they can make more informed decisions, thereby improving the impact of the CPP enhancements as well as retirement income outcomes in general.

Further, this study concentrated on the CPP enhancements from a benefits perspective, but it did not address risk. With Canadians increasingly bearing responsibility for managing their post-retirement risks, one of the biggest potential advantages of the CPP enhancements is the ability to help protect elderly

Canadians against the risks associated with inflation, financial markets and longevity. Although important, the evaluation of post-retirement risk exposures for Canada's aging population is beyond the scope of this paper. Empirical data on how Canadians manage their savings in retirement is limited, making analysis of this topic challenging and another area for future investigation.

A final concern is that, aside from low-income workers, nearly a quarter of Canadians are projected to be unprepared to sustain their living standards in retirement *despite* the CPP enhancements. And this ratio increases to over a third for Canadians without meaningful employer pension plan participation. In addition, 2070 is very far in the future, and these results do not inform the retirement financial prospects of older Canadians (for whom the CPP enhancements will do very little, because of the slow maturation of the enhancements) or the potential cost and risk implications of an aging population for Canada's shrinking workforce. These are important areas of research where innovative solutions are urgently needed [see, for example, Brown and Aris [2017]; MacDonald [2018], and Genest-Gregoire et al. (forthcoming)].

There are clearly challenges ahead – and while the goal is retirement security for all Canadians, it will also be important to protect the financial welfare of the working-age population. Evidence suggests the CPP enhancements are a step in the right direction.

SECTION 2: BACKGROUND AND SCOPE

2.1 Introduction

The Canada Pension Plan (CPP), combined with Old Age Security and the Guaranteed Income Supplement, has been a major success story for Canada. It makes up a major piece of the retirement income provisions for Canadians, and the program is considered sustainable for at least the next 75 years.[1]

For years, politicians, pension industry leaders, unions, and special interest groups (including seniors themselves) have been calling for expansion of the CPP. On June 20th, 2016, Finance Minister Bill Morneau announced an expansion to the Canada Pension Plan that marks the most significant change in Canada's three-pillar retirement income system in half a century.[2] The expansion includes:

- an eight percent increase in the earnings replacement rate from 25 percent to 33 percent, and
- a 14 percent increase in the maximum level of covered earnings (OSFI, 2016b).

The CPP enhancements will be fully funded by an increase of two percent in the contribution rate up to the current earnings limit, and a new eight percent contribution rate between the current earnings limit and the 14 percent increased earnings limit. The new contribution will be shared equally between employer and employee, and is tax deductible for both.

Canadians are primarily concerned about how much money the enhancement will put into their pockets at the end of the day. And while the gross benefits of the CPP enhancements are easily summarized, the implications of these changes to the CPP benefit and contribution structure for consumable income are not clear. The Canadian retirement income system is an integrated and dynamic one, made up of complex tax and social benefit programs in which a change in one income flow can trigger a complex network of repercussions and financial trade-offs. Stakeholders, such as employer pension plan sponsors, politicians, special interest groups, academics, financial service professionals, and Canadians saving for retirement, will want to know how these reforms will affect Canadians within the overall retirement income system. Although there have been a number of studies that have investigated potential CPP reforms (for example, Kesselman [2010]; Wolfson [2011, 2013]; and Milligan and Schirle [2014]), very little is known regarding the implications of the *actual* CPP enhancements that have been adopted for the retirement prospects of individual future Canadian seniors, other than that the enhancements should help younger Canadians starting their careers, that it should do less for Canadians currently in the workforce (particularly those approaching retirement), and that the interactions between the CPP enhancements and GIS clawbacks could decrease the value of the enhancements for low-income workers (for example, see Milligan and Schirle [2016]; Baldwin and Shillington [2017]; and OSFI [2017]).

This paper aims to fill a gap in the literature by measuring the implications of the reforms for the retirement prospects of future Canadian seniors more generally. It seeks to understand the comprehensive financial implications of the CPP enhancements within the larger picture of retirement financial security for future Canadian seniors. Setting the focus on the year 2070, when the CPP enhancements will have fully matured, this paper asks the following questions:

1. What are the trade-offs occurring within the Canadian retirement income system? How will the flows from OAS, GIS, registered pension plans, and income taxes respond to the enhanced CPP benefit? In other words, what are the "net" benefits?

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[1] Canada (2015)
[2] Vettese (2016) gives a historical account of the origins of the CPP.

2. Who is affected by the CPP enhancements, and by how much? (Females? Males? High-earners? Low-earners? Workers with or without employer pension plan coverage?)

The study's aim is to capture the implications of the CPP enhancements based on what we know today regarding the Canadian population, informed projections, and plausible scenarios. This requires looking far into the future, when the CPP enhancements will be completely phased in. With a seven-year phase-in period starting in 2019, followed by 40 years of maturation, the full benefits will be matured for Canadians turning 65 in 2070-74.

The analysis employs two different measurement "lenses"—one for each question:

1. Income flows: The first lens employs mean longitudinal income flows (that is, I will summarize the average incomes flows across each senior's lifetime from age 70 until death).
2. Living standards: The second lens assesses how much the CPP enhancements will help to maintain the living standards of Canadians after retirement. For this, I employ the metric "Living Standards Replacement Rate" (LSRR). Explained in MacDonald et al. (2016), the LSRR assesses how well a worker's living standards are maintained after retirement using income and wealth outcomes. Designed as a more accurate alternative to the conventional "final earnings replacement rate," the goal of the LSRR is to capture a worker's living standards continuity after retirement. It compares how much money a worker has, on average, to spend on personal consumption of goods and services before and after retirement. Its purpose is to serve as a retirement income adequacy statistic that is more accurate, understandable, and consistent in its application to analysis compared to the conventional gross earnings replacement rate measure.

A desirable third lens would be to measure the degree to which the CPP enhancements reduce post-retirement financial risk for Canadians. Being a lifetime benefit that is indexed by inflation, CPP benefits provide a very effective vehicle for protecting seniors against the risks of poor financial market returns, high inflation, and outliving their savings (see Section 2.3 for further discussion). Although important, the evaluation of this reduction in risk is beyond the scope of the paper. A thorough understanding of the value of such downside risk protection requires informed assumptions regarding how Canadians would otherwise draw down their retirement savings in the absence of these funds being allocated to enhanced CPP benefits. The data on "drawdown behavior" is weak, and, correspondingly, the modelling of this behaviour in this paper's tool of analysis (LifePaths—see below) is simplified. While drawdown behaviour in retirement is not central to calculating the LSRR measure (owing to its reliance on averages across retirement), drawdown behaviour is critical to a proper evaluation of the degree to which a Canadian's post-retirement financial risks are reduced by the CPP enhancements. Overall, it can be said that the enhanced benefits will reduce risk exposure, but the magnitude of this protection is outside the scope of this paper.

This paper evaluates the impact of the Canada Pension Plan on retirement outcomes by looking through the above two lenses across three alternative scenarios of the future—[1] no CPP enhancements (Scenario "Original CPP"); [2] CPP enhancements with no behavioural responses from individuals and employers (Scenario "Enhanced CPP"); and [3] CPP enhancements with some behavioural responses: a one-dollar increase in CPP contributions is offset by a one-dollar decrease in savings by individuals (where applicable), a redesign among employer-registered pension plans (RPPs) already integrated with the CPP to further integrate with enhanced CPP benefits, and an aggregate decline in RPP coverage as sponsors decide to terminate plans in response to the CPP enhancements (Scenario "Enhanced CPP with Behavioral Response"). Although the magnitude of the voluntary savings response to greater compulsory savings is

unclear, testing a "dollar-for-dollar" scenario reflects a more severe view of the potential impact.[3]

The chosen behavioural responses were motivated by scenarios that have already been designed within the tool of analysis (LifePaths—see below) or were feasible to model within this tool for the purpose of this study. These modeled behavioural responses are intended to offer some insight into possible implications, but are not intended to represent a comprehensively realistic picture. For exampleLifePaths was conducive to including the behavioural response of RPP sponsors with integrated pension plans to integrate their plans further (and essentially target a "net zero" impact). This scenario implies, however, that there will be no response from sponsors of non-integrated plans (such as the vast majority of DC plans, flat benefit plans, and some private-sector plans). The scenario is, therefore, limited since it is unrealistic to think that sponsors of integrated plans will completely offset CPP enhancement costs while employers of non-integrated plans will fully absorb the additional costs. In reality, there will likely be varied responses from sponsors of integrated as well as non-integrated plans that will be driven by the costs associated with the CPP enhancements. The CPP enhancements have offered a potentially valuable opportunity for sponsors to assess and redesign existing pension plans. For example, rather than decide to integrate with the enhanced CPP benefits further, integrated RPPs may choose to scale back benefits, stack the CPP enhancement, or even "de-integrate" entirely. Similarly, non-integrated plans may choose to stack the CPP enhancements, scale back benefits, or incorporate a partial or full integration. The direction of these varied potential changes in designs is outside the scope of this analysis.

In addition to the varied responses by RPPs, there are many other possible behavioural responses to the enhanced CPP that are not modeled. For example, the CPP enhancements could possibly have macroeconomic impact, since reduced voluntary savings could affect capital markets that may indirectly affect the growth rate of the economy. But the reverse could also be true on account of the compulsory savings redirected through the CPP Investment Board (CPPIB). In addition, the new costs to employers could have an impact on jobs and wages. Also outside the scope of this project are the possible responses if the CPP contributions, as projected by the Chief Actuary and subsequently embodied in the legislation, are not sufficient to pay for the benefits—such responses include higher taxation on the working population (see Ambachtsheer [2016] and Robson and Laurin [2017] for greater discussion). Overall, although behavioural response modeling is a novel and important addition to the literature, the scenario being modeled has many limitations, and is a potential area of future investigation.

A fundamental difficulty in understanding the actual implications of the CPP enhancement for the retirement prospects of Canadians is that it requires a realistic future projection of a sufficient sample of the Canadian population. This projected population dataset would need to include each person's relevant characteristics and income flow details, while accounting for complexity and diversity across individual life courses. The second challenge is that the projections would need to model all of the interactions among income flows over time, so that changing one element of the system (namely CPP benefit and contribution levels) triggers the correct response from other elements (such as taxes, OAS/GIS, and other sources of retirement income).

I carry out this analysis, therefore, using Statistics Canada's LifePaths dynamic microsimulation model of the Canadian population.[4] LifePaths is a computer simulation model that integrates the wide range of data that is available at Statistics Canada. LifePaths simulates the past, present and future of a realistic synthetic population using behavioural equations estimated from historical data, all with a life-course perspective. It is calibrated so that it outputs a representative modelled population that is consistent with available microdata on Canadians. This allows for more detailed analyses of the socioeconomic experiences of

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[3] Vaillancourt et al. (2015) presented empirical Canadian evidence to support a "dollar-for-dollar" response in savings to involuntary CPP contributions.
[4] The opinions expressed and conclusions reached by the author are her own and do not represent any official position or opinion of Statistics Canada. The author takes full responsibility for the assumptions underlying the projection scenario used.

Canadians than would otherwise be possible. More relevant to this study is that these behavioural equations within a computer simulation model allow for testing the impact of changes to public policies in the future. Examples of studies that employed LifePaths for projecting retirement income outcomes for Canadians include Moore et al. (2010), TD Economics (2010), MacDonald et al. (2011), Wolfson (2011, 2013), MacDonald and Osberg (2014), and Baldwin and Moore (2016).

LifePaths is a long-standing model that has been employed numerous times to investigate the Canadian pension system, but was recently terminated in 2014 after nearly 25 years of development. The model is becoming increasingly outdated, and does not include recent changes to GIS top-ups since 2010, provincial senior supplement income programs and other senior subsidies,[5] the 2007 income-splitting allowances for seniors, and the introduction of Tax-Free Savings Accounts (TFSAs). On the other hand, the projections required for this study are very long-term (the focus is 2070), and therefore many new changes to the system are likely to evolve before that time. Despite these significant limitations, the purpose of this study is to provide some clarity on the implications of the CPP enhancement, and the valuable features that LifePaths provides include that it (1) captures the realistic diversity of the Canadian population—between people and over time, historically as well as informed projections into the future; (2) provides necessary data on life-course elements for individual Canadians, year by year, from birth until death; and (3) integrates the financial picture of the individual Canadian into the entire Canadian financial system of income, taxes, and transfers, thereby allowing the correct responses to be triggered in alternative possible futures.

This is why, prior to its termination, LifePaths was regularly employed by Canadian federal policy departments and provincial ministries involved in policy development in the evaluation of the long-term effects of current or proposed social policy interventions on individual Canadians. Although incomplete, complex, and increasingly outdated, LifePaths nevertheless remains the best tool in Canada capable of comprehensively testing changes to the Canadian retirement income system and their impact on individuals and families.

Properly quantifying the CPP enhancements is not only a generally interesting (and arguably imperative) exercise, it will also help inform future debate on whether the reforms were "enough" or "not enough." Plan sponsors, politicians, special interest groups, academics, and Canadians saving for retirement will want to know what these reforms mean within the overall Canadian system (not just in terms of gross benefit rates and contributions). Prior to its termination, much of LifePaths' development over the past decade was to inform the CPP enhancement debate, and therefore I am fortunate to have this tool to build on. This paper aims to address these unanswered questions using the tool intended for this work, thereby providing an authoritative, informed, evidence-based, unbiased, credible, publicly-available, high-quality assessment of the impact of CPP enhancements.

2.2 Canada's Retirement Income System and Causes for Concern

The Canadian government's public pension program is made-up of the Canada/Quebec Pension Plans (C/QPP) along with the universal Old Age Security (OAS) and the income-tested Guaranteed Income Supplement (GIS). These programs protect seniors against poverty while also helping preserve their standard of living after retirement. While all three components contribute to both goals, OAS and GIS provide an income-tested floor available to all Canadians and are therefore considered to have a stronger anti-poverty focus. On the other hand, being a mandatory earnings-related program for all Canadian workers over the age of 18, C/QPP is more directly linked to helping Canadian workers maintain their living standards after retirement.

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[5] In Ontario, for example, these include Ontario seniors' Guaranteed Annual Income System, tax credits for public transit and home renovations, as well as programs for drugs and housing.

Research has found that the Canadian retirement income system has been very effective in reducing poverty among seniors (Osberg [2001]; Baker and Gunderson [2005]; Veall [2007]; Milligan [2008]). On the other hand, there has been growing concern that Canadian workers are at risk of not maintaining their living standards after retirement—particularly middle and upper-earning Canadians without workplace pensions (see Moore et al. [2010]; MacDonald et al. [2011]; Wolfson [2011]; and Baldwin and Shillington [2017]).

For example, compared to the United States, Canada's public retirement system is less effective at replacing the standard of living of middle-class Canadians after retirement. Table 1 shows OECD (2013) calculations of the net replacement rates for stylized individual Canadians and Americans who entered the labour market in 2008 and spent their entire working lives under the same set of rules (the net replacement rate is calculated as the net pension entitlements divided by net pre-retirement earnings—net of income taxes and social security contributions). The net replacement provided by the American public pension system better replaces the standard of living of those Americans after retirement who were earning 150 percent of the average wage (assumed to be earned throughout the career), while the Canadian system better replaces that of Canadians who were earning 50 percent of the average wage.

Table 1 highlights that, at least compared to the US (and using the OECD's highly stylized evaluation for comparison purposes only), Canada's public pensions have a strong anti-poverty focus with less emphasis on sustaining living standards after retirement for those earning higher than the average wage. And the capacity of the public system to sustain Canadian living standards has been projected to decline (Moore et al. (2010)). Some of the reasons include: greater female participation in the workforce, which is projected to continue increasing pre-retirement living standards at a household level without a commensurate increase in OAS benefits in retirement, and OAS/GIS benefits that are indexed to inflation and therefore lag behind real wage growth. The declining proportion of the population in the labour force is likely to create an even greater disparity between wage growth and price inflation going forward. Consequently, real wage growth will increasingly reduce the effectiveness of OAS/GIS in sustaining pre-retirement living standards for future Canadian seniors.

Table 1
OECD Net Pension Entitlements' Replacement Rates of Workers in Canada and the US at 50%, 100% and 150% of Average Wage.

	0.50 of AW	1.00 of AW	1.50 of AW
Canada	88.7%	57.3%	39.7%
U.S.	63.8%	50.0%	46.6%

Source: OECD "Pensions at a Glance indicators"
http://stats.oecd.org/Index.aspx?DataSetCode=ELSPENSIONS

An important motivation behind expanding the CPP has been the decline in employer pension plan coverage across Canada. In the private sector, for example, pension plan participation declined from just under a third to a quarter between 1987 and 2010 (MacDonald and Osberg 2013).[6] Among those employer plans that remain, moreover, there has been an ongoing shift in the private sector from a defined benefit (DB) to defined contribution (DC) design, which largely shifts the market risk of benefit payments to individual retirees. In a low interest-rate environment, moreover, shifting to a DC pension plan design reduces costs for plan sponsors and typically leads to much lower projected pensions. Between 1980 and 2012, for example, the proportion of RPP members in DB plans fell from 94 percent to 73 percent across

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[6] See, for example, the recent CBC article "Retirement? Few Canadians without an employer pension plan have enough money, study says," which is based on Richard Shillington's report with the Broadbent Institute (Shillington, 2017). http://www.cbc.ca/news/business/retirement-savings-broadbent-institute-1.3450084

the public and private sectors, with a drop from 90 percent to 51 percent coming from within the private sector (Baldwin 2015).

2.3 CPP Enhancements

On the surface, the CPP enhancements (presented in table 2) are theoretically appealing. The intention behind the CPP enhancements is to ensure that Canadian workers save more for retirement, and an additional appeal of the CPP enhancements is that, like the risk pooling underlying annuitization, it should help to reduce the exposure of seniors to the effects of longevity and financial market risk.[7] MacDonald and Osberg (2013) found that the fixed income provided by the CPP shields Canadian seniors from poor financial markets. Like annuitants, CPP members receive secure payments until death, as well as benefit from mortality risk pooling; that is, those who live will profit from the invested capital of those who die.

But CPP enhancements provide even greater protection, since this mandated solution does not carry the drag of adverse-selection experienced in the private market (which drives up the price of annuitization). CPP participants are calculated to receive an underlying 4.4 percent aggregated internal rate of return according to the Chief Actuary's report (table 20, OSFI 2016a), which is reasonably attractive to an individual in today's financial environment. Moreover, the CPP provides seniors with inflation-indexed payouts—a feature not available in the Canadian private annuity market. The corrosive effect of inflation is often underestimated at the outset of retirement (SOA 2016), but more than half of Canadians will live past age 85, at which time inflation will have eroded the purchasing power of fixed income by nearly a third (assuming two percent per year, compounded over 20 years). The inflation-protection helps to sustain an individual's standard of living throughout retirement, and has been found to be a valuable feature when drawing down retirement savings (see Macdonald et al. [2013] for discussion). CPP benefits combined with OAS/GIS benefits serve as a secure income stream to cover the lifetime daily expenses of many Canadian seniors.

It should be noted, however, that although CPP benefits are considered a secure source of retirement income, they are not fully guaranteed. Amendments to the CPP in 1997 made indexation of the base benefits contingent on the funded status of the plan, and it is still unknown how the additional benefits will be affected by funding shortfalls (see Ambachtsheer [2016] and Robson and Laurin [2017] for further discussion).

Overall, the added security of the fixed income provided by the CPP enhancements is potentially valuable in helping Canadians face the unknown risks that retirement brings—including advanced-life healthcare costs and home care expenses, investment and inflation risk, maintaining lifestyle, and outliving savings. This added protection is attractive in today's environment, considering the 2008 turbulence in the financial markets, a projected long-term low interest rate environment in Canada and other industrialized countries (Reinhart and Rogoff 2009; Guay and Jean 2013; King and Low 2014), rising divorce rates among seniors (with likely negative financial implications) (Brown and Lin 2012), longer life expectancy, and the anticipated decline in the role of families in providing long-term care for Canadian seniors (among many, see AARP [2008]; Keefe et al. [2012]; Pickhard [2008, 2011]). In light of these challenges, CPP provides a stable, foreseeable income stream that facilitates financial planning, financial independence, and peace of mind for Canadian seniors and their families.

All dollar values presented in this paper are in Canadian dollars.

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[7] Academic literature on how best to decumulate retirement savings finds almost without exception that workers would benefit greatly by choosing to annuitize a significant portion of their savings in retirement (MacDonald et al.2013). But voluntary annuitization is rare, for a variety of reasons that have been the focus of much study (ibid.).

Table 2
Canadian Public Pension System

Source: This table builds on and updates that given in Milligan and Schirle (2016, Box 1, pg.3)

Original CPP	25 percent replacement rate on average earnings up to the year's maximum pensionable earnings (YMPE, $55,300 in 2017). CPP Income is taxable, and inflation indexing of the CPP payments is conditional on the funded status of the plan.
	Contribution rate: 9.9 percent of payroll, shared by employer and employee. Employee contributions are eligible for a non-refundable tax credit for individuals.
Expanded CPP: offered on top of existing CPP. Contributions phased in 2019–2025.	Offers an extra 8.33 percent replacement rate on average earnings up to the year's additional maximum pensionable earnings (YAMPE) (targeted to be $82,700 in 2025; equivalent value of $62,500 in 2016), which brings the CPP total replacement rate up to 33.33 percent.
	Contribution rate: two percent of payroll on earnings up to the YMPE and eight percent of payroll on earnings between YMPE and YAMPE, shared by employer and employee. Employee contributions to expanded CPP are tax deductible for individuals.
Old Age Security[8]	Offers a monthly benefit of $586.66 in January 2018, reduced by 15 percent of individual income over $73,756, until it is eliminated entirely for retirement income exceeding $119,512.
Guaranteed Income Supplement	Offers a monthly benefit of up to $876.23 for a single individual as of January 2018, which is reduced by 50 cents for every dollar of family income (excluding OAS income) so that the benefit is reduced to zero when income is over $17,784.

SECTION 3: METHODOLOGY

3.1 Tool of Analysis—Statistic Canada's LifePaths

Despite the surface appeal of the CPP enhancements, comprehensive analysis remains critical. Owing to Canada's complex tax and transfer system, policy changes without adequate quantitative analysis can have unclear consequences. This concern is illustrated by the recent questions raised regarding the impact of the CPP enhancements on low-earning Canadian workers (see Section 2.1).

Baldwin and Shillington expressed this problem when they wrote that "the Canadian retirement income system (RIS) is complex and full of interactions among its component parts and between them and the income tax system; and the outcomes of the RIS are constantly changing as the environment in which it operates changes. The main implication of the first theme is that the RIS needs to be evaluated as a whole, and changes to components of the RIS can be fully understood only after the interactions have been accounted for" (2017, 25).

And the complexity of the RIS is secondary to the complexity of the population. LifePaths' largest contribution lies in its ability to analyze policy and assess changes for a highly complex, diverse population with realistic life courses that is a reasonable representation of the actual Canadian population. Microsimulation models enable analysts to understand the dynamics of the enhancements within Canada's

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[8] https://www.canada.ca/en/employment-social-development/programs/pensions/pension/statistics/2018-quarterly-january-march.html

entire RIS and diverse population, so as to evaluate the financial tradeoffs and consequences. The difficulty is that the Canadian RIS is not only a complicated system of financial flows that follow prescribed tax and benefit rules; the Canadian RIS is a *complex* system with separate components that are intimately connected and interdependent. And each component—the worker, the tax rules, the political interests, and so on—are systems within systems. And none of these systems is static; the RIS is a living system that adapts and evolves. For example, a worker's earnings will influence whether he/she buys a house, how long he/she lives, his/her potential to save for retirement, get married, have children, and so on, and these components can feed back into each other. Having children, for example, affects a parent's capacity to work and earn income.

Equal to the importance of properly modeling the intricate tradeoffs and interdependencies within the Canadian RIS at any particular time, therefore, is the importance of understanding how these dynamics evolve and co-evolve over time. A good example lies in the importance of modeling the realistic dynamics of an individual's earnings history. Earnings across workers' careers are considerably more volatile than is habitually assumed (see Finnie [1999]; Beach and Finnie [2004]; Morrison [2000]). Workers often move in and out of any particular "earnings" ranking throughout their career. Therefore, it is inadvisable to approach earnings classifications simplistically at any single point in time. An individual's earnings history shapes C/QPP contributions and benefits, as well as employer pension plan contributions and benefits, savings, government transfers, and taxes. Their realistic dynamics should, therefore, be captured. Varied and complex earning histories will trigger financial repercussions that cannot be simplified or anticipated without proper longitudinal modeling and analyses.

The value of microsimulation was explained elegantly by Klevmarken nearly two decades ago when he wrote, "The micro-simulation approach is thus primarily designed for studies of the distributional effects of economic policy, and one of its main advantages is that it permits assumptions of heterogeneous behavior. This, as a matter of fact, widens the scope of micro-simulation beyond that of conventional econometric modeling. When economic relations are highly nonlinear, when tax laws and rules of transfer programs introduce censoring and truncation and when sub-populations differ in behavior, then models of average behavior become inadequate to evaluate the average impact of policy changes, while a micro-simulation model can be used also for this purpose" (Klevmarken 1997, 2).

The present paper evaluates the impact of the CPP enhancements by building on Statistics Canada's LifePaths microsimulation model (Spielauer 2013). LifePaths is a dynamic microsimulation model of the Canadian population that stochastically simulates the components of the life course (birth, education, employment, income, taxes, marriage, child-bearing, retirement, etc.) for synthetic individuals who are representative of the Canadian population. Using behavioural equations, it simulates each "life-path" year-by-year and case-by-case, while striving primarily to match existing Canadian data and incorporate the diversity among individuals and over each person's life course. Figure 1 provides a representation of a life path. This is a simplified flow chart for illustration purposes, with only some components listed, and is not intended to convey the true complexity of LifePaths. For each simulated life, LifePaths tracks the individual's relevant characteristics, such as those listed in the first box. These characteristics enter as explanatory variables to simulate stochastically the occurrence of each possible event (arrow A). Once an event occurs, the individual's characteristics are updated (arrow B). These characteristics then enter again as explanatory variables to determine the next event (arrow A). Each event is stochastically simulated until death, thus creating a complete life course with all of the necessary details and realistic diversity for millions of simulated Canadians. In this way, LifePaths summarizes, incorporates, and integrates an enormous range of Canadian data to simulate

- statistically representative data samples of the history of the Canadian population, and
- future population projections (based on informed default assumptions).

LifePaths was explicitly developed to test such "what-if" scenarios of the future for the purpose of testing Canadian public policy, using a comprehensive and integrated perspective on the entire Canadian socioeconomic system. It was developed over nearly a quarter of a century by arguably some of the world's best microsimulation modeling experts. In terms of testing CPP expansions, it is the best tool for the job (which is why the federal government used LifePaths in 2010 for this purpose). Nevertheless, the strength of LifePaths is also its downfall—it is very complex and vast.

Another important limitation of using LifePaths for this analysis is that the modeling of provincial seniors' income supplements and other provincial senior programs/tax credits is not developed, and in some provinces these subsidies are substantial. This was an area intended for further development before LifePaths was terminated, and is outside of scope for this project. Any future analysis using LifePaths that intends to understand the situation of low-income Canadian seniors more profoundly would need to include these provincial programs, as well as recent GIS top-ups since 2010, the 2007 income-splitting allowances for seniors, and the introduction of TFSAs.

Figure 1

Illustration of LifePaths' simulation of a Canadian life course.

Source: Adapted from MacDonald et al. 2011, Figure 1.
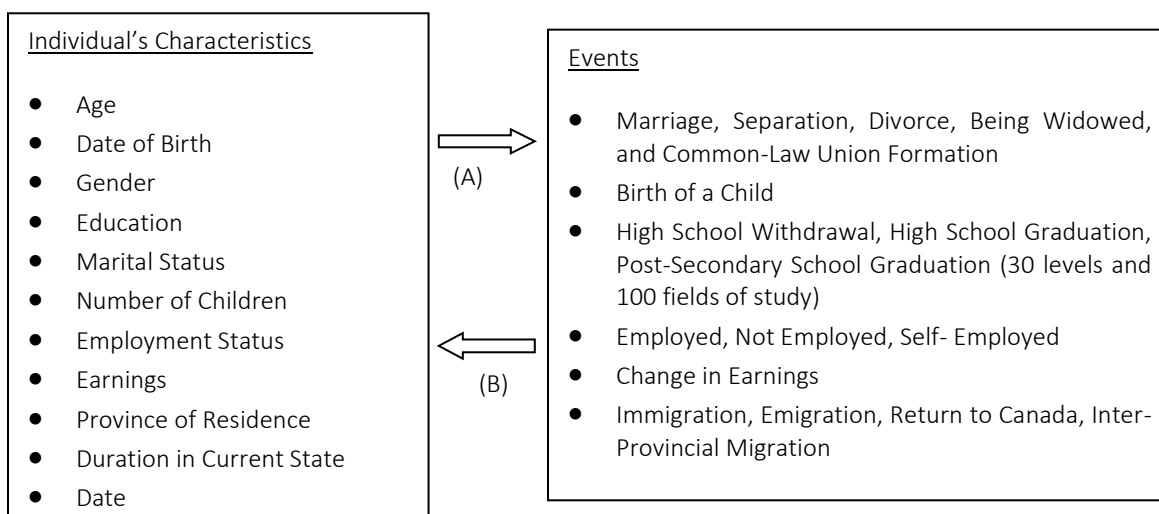
3.2 Key Scenario Projection Assumptions

This project is made possible by building on LifePaths Model version 5.1.4.6. LifePaths' simulation of the past uses behavioural equations estimated from historical data to build a representative modeled population that is consistent with all available microdata on Canadians Simulations of the future, however, require assumptions, and I rely predominantly on the default future projection scenarios built into LifePaths:

- An aggregate average real wage growth rate of 1.3 percent and inflation rate of 2.3 percent;
- The continuation of public pension program provisions, and payroll and income tax systems, as of 2010;
- Future real market rates of return held by RRSPs and defined contribution pension plans are modeled stochastically, calibrated to reproduce observed stocks of RRSP wealth in Statistics Canada's Surveys of Financial Security for 1999 and 2005. The average net nominal rate of return realized by individuals,

after management fees and penalties, is 3.7 percent for RRSPs and 5.1 percent for defined contribution pension plan investments.[9]

- The continuation of recently observed registered pension plan (RPP) coverage;

- Housing values grow at a rate halfway between inflation and wage growth;

- A modest trend away from marriage (among all age cohorts, including seniors);

- A flattening out of increasing female labour participation rates and post-secondary education attainment; and

- A modest trend of increasing life expectancy and fewer children across future cohorts according to the medium demographic assumptions for fertility, mortality, and migration from Statistics Canada's official population projections (Statistics Canada 2005).

Table 3 shows how the assumptions diverge among the three scenarios. Note that the behavioural response scenario assumes an implicit floor of "no savings" (that is, no one is assumed to withdraw from RRSPs or borrow to meet the dollar-for-dollar offset to the CPP enhanced contributions). This dollar-for-dollar response applies only to those Canadians not in an integrated RPP, since those participating in the integrated RPP would offset (although not perfectly) the larger CPP contributions by lower contributions to the employer RPP.

The assumptions and calculations underlying the simulation results were prepared by the author, and the responsibility for the use and interpretation of these data is entirely that of the author. An overview of LifePaths can be found at the Statistics Canada Modelling Division (Spielauer 2013), which is publicly available to the interested reader and can be found on the Statistics Canada website: http://www.statcan.gc.ca/microsimulation/lifepaths/lifepaths-eng.htm

Table 3
Three Future Scenarios

	Scenario Original CPP	Scenario Enhanced CPP	Scenario Enhanced CPP with Behavioral Response
CPP Program	- Canadian/Quebec pension program (C/QPP, OAS/GIS) as of 2011	- CPP benefits and contributions enhancements as announced by the federal government in June 2016 (see table 2) for both CPP and QPP	
RRSP Behavior	- A continuation into the future of historical RRSP saving behaviour observed over the past decade. (i.e., until about 2010)		- For individuals not in an integrated RPP, a $1 reduction in RRSP contributions for every $1 of new C/QPP contribution.
Employer registered pension plans	- A leveling off of pension coverage (already incorporated in LifePaths' default projections)		- An aggregate downward trend in employer RPP coverage, particularly defined benefit plan coverage in the private sector, with a greater number of employers freezing or terminating existing employer RPPs.[10] - Full integration of enhanced C/QPP benefits for RPPs already integrated with the C/QPP. - No integration for RPPs not already integrated (therefore assuming employers will fully absorb CPP enhancements with no offset—see Section 2.1 for discussion).

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[9] The average net nominal return on RRSP savings is on par with the more recent 2017 projection assumption guidelines compiled by the Institut québécois de planification financière (IQPF) and the Financial Planning Standards Council (FPSC) (Bachand et al. 2017), where the recommended net nominal return after fees for a balanced portfolio is 3.92 percent (Bachand et al. 2017, 11).

[10] The overall feedback modeled is an aggregate downward trend in employer pension plan coverage (more specifically, over the next 20 years, peak life-cycle annual RPP coverage in the private sector will fall by roughly 20 percent.)

3.3 Defining Output Measures

Across the three scenarios detailed in table 3, this analysis compares each individual senior's primary retirement income sources, as well as the "annual income available for individual consumption" described in Figure 3. The future financial outcomes are reported in "real" or "constant dollar" income using the All-Items Consumer Price Index for Canada, expressed in 2017 dollars.[11] I also employ the summary statistic Living Standards Replacement Rate (LSRR), which I describe next.

3.3.1 The Living Standard Replacement rate (LSRR)

This study evaluates retirement income adequacy using the Living Standard Replacement rate (LSRR). Outlined in MacDonald et al. (2016), the LSRR is intended to provide a more accurate alternative to the conventional final gross earnings replacement rate. The LSRR aims to capture a worker's living standards continuity after retirement, by calculating and comparing the amount of money a worker has to spend on personal consumption of goods and services before and after retirement.

Living Standards Replacement Rate (LSRR)

= *Average* Retirement Living Standards   *Average* Working-life Living Standards

= *Average Real* Retirement Income for Individual Consumption Expenditure   (1)   *Trimmed Average Real* Working Income for Individual Consumption Expenditure

Replacement rate metrics require a number of assumptions and methodological decisions. This section reviews some of them, but a comprehensive examination in the context of previous literature can be found in MacDonald et al. (2016). For example, there are other approaches to capturing representative income available for spending after retirement—while this study employs averages, an alternative approach has taken income snapshots at several post-retirement ages.[12]

A trimmed average of income is used in the working life, which is calculated from the 20 years leading up to retirement, removing the incomes in the lowest and highest five years, and averaging the real income of the remaining middle 10 years. As explained in MacDonald et al. (2016), trimming reduces the influence of outlier years (both abnormally low and high employment earning years—which is particularly important among the self-employed, for whom employment earnings can be negative). After retirement, income sources are relatively more stable, and therefore a conventional average is employed. CPP benefits can be taken up anytime between age 60 and age 70. To ensure the complete separation of the CPP contributory and take-up stages, the working-life period of examination is ages 40 to 59, while the retirement period is taken as extending from age 70 until death.

Overall, the LSRR depends on income flows from ages 40 to 60, and age 70 onward. Therefore, this analysis does not include Canadians who die before reaching age 70 or immigrants who arrive after age 40, as either would create missing years in the income measured in the numerator and denominators (resulting in inconsistent outputs).

The LSRR uses a comprehensive definition of income over the individual's entire lifetime (year by year at the family level, making appropriate adjustments for inflation and family size). This includes non-traditional working and retirement income sources, including primary housing, non-registered financial assets, real estate assets other than primary housing, and business equity, less debt). Figure 3 outlines the components of income in each year. All income flows are measured at the census-family level, corrected for inflation, and adjusted for family size using the Luxembourg Income Study (LIS) equivalence scale (the square root of

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[11] Although the consumer price index is the most conventional approach to calculating constant dollars, an alternative method is to use wage indexation, which is the approach traditionally taken by the U.S. Social Security Administration (SSA 2004) in its calculation of social security replacement rates, and was also used by Wolfson (2011; 2013). Employing the consumer price index expresses future income flows in terms of its consumption value in 2017, while using a wage index also incorporates a comparison to the consumption of working generations.

[12] See, for example, Biggs and Springstead (2008); Larochelle-Cote, Myles, and Picot (2008); and Wolfson (2011, 2013).

household size).[13]

At age 65, DC accounts are converted into a nominally fixed annuity, and retirees are assumed to draw down all other savings either through discretionary withdrawals or by purchasing an annuity. Assuming voluntary annuitization is a simplifying assumption and is the norm in the retirement income adequacy literature, although in reality it is extremely rare (for full discussion, see MacDonald et al. [2016]). The annuity pricing is not calculated stochastically within LifePaths, but is fixed at prevailing current group annuity price rates.[14] Although not ideal, this is a further simplification of the already extremely simplifying annuitization assumption that nevertheless predominates in the literature on retirement income adequacy.

In the projections, Canadians are assumed not to draw on their housing equity in retirement to support consumption. Assuming that retirees draw on housing equity to support consumption is reasonably common in this line of research, although it is a controversial assumption since the equity in the home does not appear to generally factor into typical retirement income. Seniors are less likely to move from (and sell) their home than any other age group (Clark 2005), and they generally only do so after a major life event (such as illness or the death of a spouse) (Venti and Wise 2001, 2004). In addition, the purchase of financial instruments that draw on housing equity (such as reverse mortgages) continues to be rare in Canada (Chiuri and Jappelli 2010). According to recent data, 93 percent of Canadian seniors live at home and wish to stay there (CIHR 2011). The conceptual framework adopted in this paper is that seniors do not draw on housing equity to support the replacement of working-life consumption. In this regard, housing equity can be thought of as contingency income in the case of large and unforeseen expenses in retirement or left as a bequest (although neither are modeled in this study).
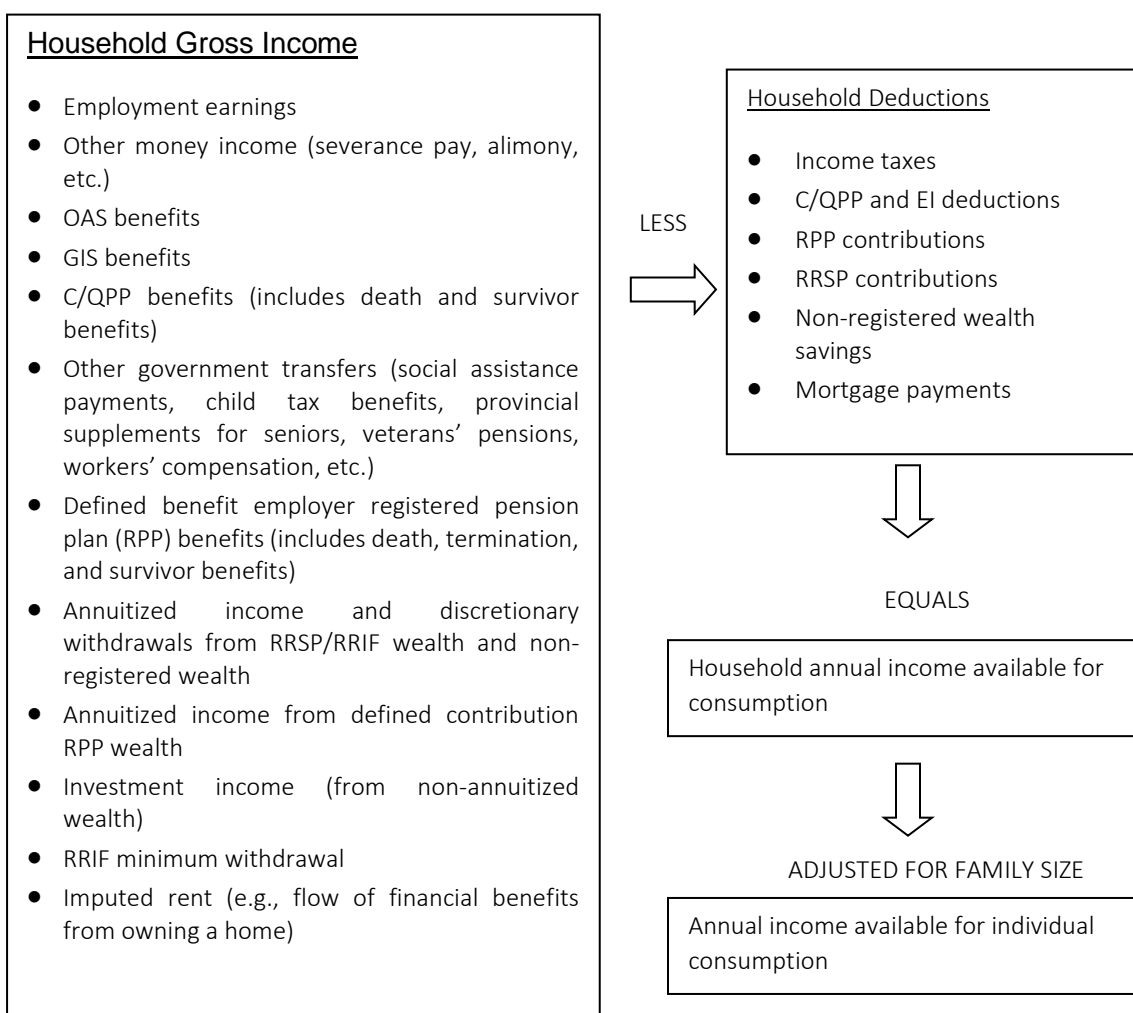
Consumption needs and spending vary tremendously and uniquely during retirement for each individual, and therefore 100 percent replacement in spending may or may not be ideal at the individual level. For general assessments of retirement income adequacy at a population level, however, the goal is to ensure continuity of current spending, or an LSRR of 100 percent.[15] When analyzing the results, 80 percent < LSRR < 120 percent is employed as the range of outcomes compatible with retirement income adequacy (that is, the continuity of working-life living standards into retirement). As explained in MacDonald et al. (2016), any range is subjective, but some support can be drawn from Binswanger and Schunk (2012, 217), which found that "a large majority of individuals aims to achieve a spending profile where, under normal circumstances, old-age spending exceeds 80 percent of working-life spending" using individually tailored internet surveys in the United States and the Netherlands.

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[13]A commonly used equivalence scale to capture the income pooling and economies of scale that individuals experience within a household is the square root of household size (Buhmann et al. 1988), i.e. if two households had the same income ($X), but one was a single-person household and the other had four members (e.g. two adults and two children), then the equivalent income of the person in the one-person household would be $X, while each person in the four person household would be assigned an equivalent income of $X/√4 = $X/2.

[14] Provided by Eckler Ltd. as of June 30, 2017.

[15] Retirement income adequacy at the population level focuses most often only on the replacement of pre-retirement consumption expenditure in post-retirement. An improvement on this methodology would be to incorporate the non-voluntary costs of healthcare associated with ageing, resulting in higher levels of spending after retirement to sustain the living standards of some Canadians. See Appendix C in MacDonald et al. (2016) for greater discussion on period-specific spending in the context of retirement income adequacy analysis.

Figure 2
The process of measuring annual income available for individual consumption. Source: Adapted from MacDonald and Osberg (2013), Figure 3.

Household Gross Income

- Employment earnings
- Other money income (severance pay, alimony, etc.)
- OAS benefits
- GIS benefits
- C/QPP benefits (includes death and survivor benefits)
- Other government transfers (social assistance payments, child tax benefits, provincial supplements for seniors, veterans' pensions, workers' compensation, etc.)
- Defined benefit employer registered pension plan (RPP) benefits (includes death, termination, and survivor benefits)
- Annuitized income and discretionary withdrawals from RRSP/RRIF wealth and non-registered wealth
- Annuitized income from defined contribution RPP wealth
- Investment income (from non-annuitized wealth)
- RRIF minimum withdrawal
- Imputed rent (e.g., flow of financial benefits from owning a home)

LESS →

Household Deductions

- Income taxes
- C/QPP and EI deductions
- RPP contributions
- RRSP contributions
- Non-registered wealth savings
- Mortgage payments

⬇

EQUALS

Household annual income available for consumption

⬇

ADJUSTED FOR FAMILY SIZE

Annual income available for individual consumption

3.4 Segmenting the population

The study's focus is on Canadians turning age 65 between 2070 and 2074, by which time the CPP enhancements will be completely phased-in (there will be a seven-year phase-in period starting in 2019, followed by 40 years). This is clearly far in the future, but it captures the full implications of the CPP enhancements based on what we know today regarding the Canadian population and informed projections.

Segmenting populations becomes much more difficult in longitudinal data relative to data from a single "snapshot" survey. For example, in a single cross-sectional survey, individuals report key characteristics at that moment in time, which makes population segmentation a straightforward task. In longitudinal data, however, the key differentiating characteristics fluctuate over time as individuals change family status, employment, earnings, employer pension plan participation, and so on. It is therefore necessary to set rules and boundaries to define each variable.

3.4.1 Income Status

To facilitate the interpretation of the results relative to the CPP pension program, I segment the population by working-life "representative" gross employment earnings in terms of the current YMPE (adjusted for inflation), where employment earnings are made up of wages and net self-employment gross income:

- <50 percent YMPE: Low Earners (20 percent of population);
- 50–100 percent YMPE: Low-Middle Earners (35 percent of population);
- 100–150 percent YMPE: High-Middle Earners (25 percent of population); and
- >150 percent YMPE: High Earners (20 percent of population).

Note that 50 percent of the 2017 YMPE is $27,650, which is very close to the calculated 2017 Low Income Measure (LIM; one half of median equivalent income),[16] making it a convenient as well as credible "low earnings" threshold. The brackets show the proportion of the sample population that this earnings group represents.

As in the LSRR calculation, I calculate a "representative" level of working-life earnings by removing the lowest and highest five years between ages 40 and 60 and averaging earnings over the remaining middle 10 years. It is necessary to use working-life earnings to segment the population, as opposed to income after age 70, in order to compare the same individuals across scenarios.

As already discussed, all income flows reported in this study employ a household-size adjustment. For the purpose of segmenting the population by earnings, however, I use per capita earnings so that the results more intuitively correspond with the YMPE (an individual-based measure). For couples, for example, the gross earnings of both spouses are combined and divided by two. In addition, as already discussed, all income flows in this study are adjusted to 2017 dollars using the consumer price index. But to categorize earnings relative to 2017 YMPE value, which is an earnings-based benchmark, future earnings are adjusted to 2017 using the average industrial wage index so as to reflect the ongoing relative relationship to the YMPE and capture the appropriate earnings distributions.

3.4.2 Employer Registered Pension Plan Participation

Given that the decline in employer RPP participation was likely an important motivator behind the CPP enhancements, I also segment the population by RPP participation. Canadians enter and exit various employer pension plans throughout their careers, and I set the cut-off at 15 years of cumulative pension plan participation by age 70 (at the family level) to capture Canadians with and without a meaningful amount of employer RPP coverage. Coincidentally, the proportion of the population falling into "non-meaningful" and "meaningful" amounts of lifetime employer RPP coverage is nearly a perfect split—49 percent having fewer than 15 years and 51 percent having more.

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[16] Specifically, the 2015 total income LIM, $25,512, adjusted by the assumed 2.3 percent inflation to 2017, is $26,543 (Source: CANSIM Table 206-0091).

SECTION 4: ANALYSIS

4.1 Impact on Income Flows

Table 4 summarizes the changes in the mean projected retirement income flows by source across the three scenarios for the population of Canadians turning 65 between 2070 and 2074. These are the mean longitudinal income flows (based on the average across each senior's lifetime from age 70 until death).

The bolded first row in table 4 shows that the CPP enhancements have the net impact of improving the mean income available for consumption across retirement by nine percent (from $64,000 to $69,500), and less improvement with behavioural responses (from $64,000 to $67,900). The CPP enhancements contribute an average increase of $8,900 in gross benefit income, increasing average CPP benefits from $20,300 to $29,200.

OAS benefits are somewhat affected by the CPP enhancements with a six percent reduction—on the other hand, GIS benefits are more significantly impacted, reducing average payouts by 29 percent. Other than taxes, which increase by 17 percent in Scenario "Enhanced CPP," the other income flows remain unchanged.

In Scenario "Enhanced CPP with Behavioural Responses," however, flows from registered wealth drop by eight percent from $6,600 to $6,100 due to reduced RRSP savings. RPPs that are integrated with the CPP will have reduced payouts, and RPPs in general will have reduced payouts if fewer plans exist, with a 11 percent drop in RPP income seen in Scenario "Enhanced CPP with Behavioural Responses." As a result of less RPP coverage, LifePaths' modelling assumes that workers delay retirement slightly, and average earnings accordingly increase modestly from $13,700 to $14,200, which also increases CPP benefits slightly for higher earners.

Overall, with a mean gross value of $8,900, the CPP enhancements will have a noticeable impact by increasing mean CPP payments by 44 percent. Taken within the entire Canadian RIS system, however, nearly 40 percent of the enhanced CPP benefit is lost to GIS (and some OAS) clawbacks and higher taxes, creating a net increase to annual income of $5,500 (from $64,000 to $69,500). In the event of assumed behavioural responses, the net increase is $3,900 (from $64,000 to $67,900).

Table 4

Mean Retirement Income by Source (averaged from age 70 until death) (2017 adult-equivalent family-based dollars)

2070-2074 "Retirement" Cohort	Scenario "Original CPP"	Scenario "Enhanced CPP"		Scenario "Enhanced CPP with Behavioral Responses"		
Income Sources	Mean (00s)	Mean	% change from Scenario "Original CPP"	Mean	% change from Scenario "Original CPP"	% change from Scenario "Enhanced CPP"
Total (annual income available for individual consumption - see Fig. 3)	$ 64,000	$69,500	9%	$67,900	6%	-2%
CPP benefits	20,300	20,300	0%	20,300	0%	0%
CPP enhancement benefits	-	8,900		8,900		0%
OAS benefits	7,100	6,700	-6%	6,900	-3%	3%
GIS benefits	700	500	-29%	500	-29%	0%
Employer pension plan benefits	21,400	21,400	0%	19,000	-11%	-11%
Flows from registered wealth	10,000	10,000	0%	9,200	-8%	-8%
Flows from non-registered wealth	2,800	2,800	0%	2,800	0%	0%
Imputed Rent	2,700	2,700	0%	2,700	0%	0%
Other income	2,900	2,900	0%	2,900	0%	0%
Employment earnings	13,700	13,700	0%	14,200	4%	4%
Income taxes	(17,500)	(20,400)	17%	(19,400)	11%	-5%

Tables 5a, 5b, 5c, and 5d report the results by earnings groups. Overall, the proportion of CPP enhancement that Canadians retain as net income is relatively consistent across earnings groups, but the dynamics are quite different, which is discussed next.

With or without the CPP enhancements, low earners (table 5a) will, unsurprisingly, receive substantially larger GIS payouts than any other earnings group. Also unsurprising is that, in absolute dollars, the drop in mean GIS benefits resulting from the CPP enhancement is largest for this group (dropping from $3,000 to $2,300)[17] Moving up the earnings distribution in tables 5b, 5c, and 5d, GIS benefits are reduced less, but taxes and, eventually, OAS benefits are increasingly affected by the benefits from the CPP enhancement.[18]

Table 5a

Mean Retirement Income by Source (averaged from age 70 until death) (2017 adult-equivalent family-based dollars) for *Low Earners (<50 percent YMPE)*

2070-2074 "Retirement" Cohort: Low-Earners (Below 50% YMPE)	Scenario "Original CPP"	Scenario "Enhanced CPP"	Scenario "Enhanced CPP with Behavioral Responses"
Income Sources	Mean (00s)	Mean	Mean
Total (annual income available for individual consumption - see Fig. 3)	$ 32,000	$ 34,100	$ 33,700
CPP benefits	9,900	9,900	9,900
CPP enhancement benefits	-	3,600	3,600
OAS benefits	8,000	8,000	8,000
GIS benefits	3,000	2,300	2,300
Employer pension plan benefits	4,300	4,300	3,900
Flows from registered wealth	2,000	2,000	1,800
Flows from non-registered wealth	500	500	500
Imputed Rent	900	900	900
Other income	2,400	2,400	2,400
Employment earnings	4,100	4,100	4,100
Income taxes	(3,200)	(3,900)	(3,700)

Table 5b

Mean Retirement Income by Source (averaged from age 70 until death) (2017 adult-equivalent family-based dollars) for Low-Middle Earners (50–100 percent YMPE)

2070-2074 "Retirement" Cohort: Low-Middle Earners (50-100% YMPE)	Scenario "Original CPP"	Scenario "Enhanced CPP"	Scenario "Enhanced CPP with Behavioral Responses"
Income Sources	Mean (00s)	Mean	Mean
Total (annual income available for individual consumption - see Fig. 3)	$ 50,800	$ 55,900	$ 54,500
CPP benefits	19,200	19,200	19,300
CPP enhancement benefits	-	7,700	7,700
OAS benefits	7,800	7,700	7,700
GIS benefits	300	200	200
Employer pension plan benefits	13,700	13,700	11,800
Flows from registered wealth	5,600	5,600	4,900
Flows from non-registered wealth	1,300	1,300	1,300
Imputed Rent	2,200	2,200	2,200
Other income	2,500	2,500	2,500
Employment earnings	8,500	8,500	8,700
Income taxes	(10,300)	(12,600)	(11,900)

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[17] As explained in Section 3.1, note that these results do not incorporate provincial low-income programs, or recent GIS top-ups since 2010.
[18] The net annual income of $32,000 available for consumption may be considered high for a low-income group by today's standards. There are a number of substantial trends underlying these results, the most important being that the results are deflated with inflation from 2070 to 2017, whereas many income soureses are driven by wages (which are assumed to increase by1.3 percent per annum in real terms).

Table 5c

Mean Retirement Income by Source (averaged from age 70 until death) (2017 adult-equivalent family-based dollars) for High-Middle Earners (100–150 percent YMPE)

2070-2074 "Retirement" Cohort : High-Middle Earners (100-150% YMPE)	Scenario "Original CPP"	Scenario "Enhanced CPP"	Scenario "Enhanced CPP with Behavioral Responses"
Income Sources	Mean (00s)	Mean	Mean
Total (annual income available for individual consumption - see Fig. 3)	$ 72,400	$ 79,300	$ 77,000
CPP benefits	24,600	24,600	24,600
CPP enhancement benefits	-	11,300	11,300
OAS benefits	7,000	6,400	6,700
GIS benefits	100	-	-
Employer pension plan benefits	26,000	26,000	22,600
Flows from registered wealth	11,600	11,600	10,500
Flows from non-registered wealth	3,200	3,200	3,200
Imputed Rent	3,200	3,200	3,200
Other income	3,000	3,000	3,000
Employment earnings	14,100	14,100	14,600
Income taxes	(20,400)	(24,100)	(22,800)

Table 5d

Mean Retirement Income by Source (averaged from age 70 until death) (2017 adult-equivalent family-based dollars) for High Earners (>150 percent YMPE)

2070-2074 "Retirement" Cohort: High Earners (>150% YMPE)	Scenario Original CPP"	Scenario "Enhanced CPP"	Scenario "Enhanced CPP with Behavioral Responses"
Income Sources	Mean (00s)	Mean	Mean
Total (annual income available for individual consumption - see Fig. 3)	$109,200	$117,200	$ 114,600
CPP benefits	27,200	27,200	27,300
CPP enhancement benefits	-	13,500	13,600
OAS benefits	4,900	4,200	4,400
GIS benefits	-	-	-
Employer pension plan benefits	46,500	46,500	42,400
Flows from registered wealth	24,000	24,000	22,500
Flows from non-registered wealth	7,300	7,300	7,300
Imputed Rent	4,600	4,600	4,600
Other income	3,700	3,700	3,700
Employment earnings	32,400	32,400	33,300
Income taxes	(41,300)	(46,100)	(44,500)

Tables 6a and 6b summarize these impacts by showing the change in income flows resulting from the enhancement to the CPP for the four earnings groups. In the first column, "All," Canadians will earn a mean CPP enhancement benefit of $8,900 over their retirement, which will increase their net income by $5,500. For low-earning Canadians (second column), the reduction in the take-home CPP benefit from $3,600 to $2,100 reflects a $700 reduction in GIS benefits and $700 in higher taxes. Of the mean $13,500 enhanced CPP benefit for high-earning workers, $8,000 will make its way into the pocket of retirees on account of predominantly higher taxes ($4,900) and lost OAS benefits ($700).

The last row of table 6a condenses these finding. This row calculates the ratio of the increase in net income ("total" in the first row) as a proportion of the gross increase in CPP enhanced benefits (third row). It finds that the proportion of gross CPP enhancement benefits that Canadians retain as net income is relatively stable across earnings groups—62 percent overall, and 58 percent, 66 percent, 61 percent, and 59 percent. Of course, there will be heterogeneity within each earnings group, but this result suggests that the CPP

enhancement benefits offer reasonably comparable proportional value for Canadians at different earning levels.

Table 6b shows the assumed behavioural responses decreases these ratios. This is particularly true for higher earners who are projected to lose up to 60 percent of the CPP enhanced benefit (down to a net $5,400) if RRSP contributions decline dollar-for-dollar and employer RPPs respond by fully integrating benefits with the CPP enhancements and reducing coverage. It is important to note that while table 6a provides some insights into the "fairness" first-order impact of the CPP enhancements on the net benefits across earnings groups, table 6b is purely descriptive of the impacts on net income that could arise if workers and their employers choose to save less on account of the CPP enhancements (and therefore receive less).

Table 6a

Difference in Mean Retirement Income by Source (averaged from age 70 until death) between Scenario "Enhanced CPP" and Scenario "Original CPP" (2017 adult-equivalent family-based dollars)

Income Sources	Difference in Mean Income Flows between Scenario "Enhanced CPP" and Scenario "Original CPP"				
	ALL	Low Earners (<50% YMPE)	Lower-Middle Earners (50-100% YMPE)	Higher-Middle Earners (100-150% YMPE)	Higher Earners (>150% YMPE)
Total (annual income available for individual consumption - see Fig. 3)	$ 5,500	$ 2,100	$ 5,100	$ 6,900	$ 8,000
CPP benefits	-	-	-	-	-
CPP enhancement benefits	8,900	3,600	7,700	11,300	13,500
OAS benefits	(400)	-	(200)	(500)	(700)
GIS benefits	(200)	(700)	(200)	-	-
Employer pension plan benefits	-	-	-	(100)	-
Flows from registered wealth	-	-	-	-	(100)
Flows from non-registered wealth	-	-	-	-	-
Imputed Rent	-	-	-	-	-
Other income	-	-	-	-	-
Employment earnings	-	-	-	-	-
Income taxes	(2,900)	(700)	(2,300)	(3,700)	(4,900)
Net/Gross enhancement benefits	62%	58%	66%	61%	59%

Table 6b

Difference in Mean Retirement Income by Source (averaged from age 70 until death) between Scenario "Enhanced CPP with Behavioural Responses" and Scenario "Original CPP" (2017 adult-equivalent family-based dollars)

Income Sources	Difference in Mean Income Flows between Scenario "Enhanced CPP with Behavioural Responses" and Scenario "Original CPP"				
	ALL	Low Earners (<50% YMPE)	Lower-Middle Earners (50-100% YMPE)	Higher-Middle Earners (100-150% YMPE)	Higher Earners (>150% YMPE)
Total (annual income available for individual consumption - see Fig. 3)	$ 3,900	$ 1,700	$ 3,700	$ 4,600	$ 5,400
CPP benefits	-	-	-	-	100
CPP enhancement benefits	8,900	3,600	7,700	11,300	13,600
OAS benefits	(200)	-	(100)	(300)	(400)
GIS benefits	(200)	(700)	(200)	-	-
Employer pension plan benefits	(2,400)	(400)	(1,800)	(3,400)	(4,100)
Flows from registered wealth	(800)	(200)	(600)	(1,100)	(1,500)
Flows from non-registered wealth	-	-	-	-	-
Imputed Rent	-	-	-	-	-
Other income	-	-	-	-	-
Employment earnings	500	-	300	500	900
Income taxes	(1,900)	(500)	(1,600)	(2,400)	(3,200)
Net/Gross enhancement benefits	44%	47%	48%	41%	40%

4.2 Impact on Living Standards Replacement

The LSRR assesses how effective the CPP enhancements are at helping to maintain the living standards of Canadians after retirement. It does this by comparing the amount of money a worker has, on average, to spend on personal consumption of goods and services before and after retirement (see Section 3.3.1).

Table 7a tabulates the LSRR distribution by pension plan participation and gender within each of the earnings groups. Using the thresholds noted in Section 3.3.1, living standards are defined in table 7a as:

- <80 percent: declining noticeably after retirement;
- 80–120 percent: being sustained between working-life and retirement; and
- >120 percent: increase noticeably after retirement.

Retirement income inadequacy is assumed to occur when a person has an LSRR that falls below 80 percent.

The first column (1) of table 7a shows the proportion of the population represented by each sub-group. For example, low earners constitute 20 percent of the population and, among low earners, 43 percent are males and 57 percent females, 16 percent have meaningful participation in an RPP and 84 percent do not.

Column (2) shows the proportion of the population projected to not sustain their working-life living standards in retirement under the original Scenario "Original CPP." The proportion increases dramatically by earnings group (from 13 percent for low earners to 44 percent for high earners). Men and women appear almost identically prepared.[19]

Workers with meaningful workplace pension plan participation are more prepared for retirement than those without across all earnings groups. In column (2), the gap is smaller for the low earners (15 percent versus five percent), and widens for the higher earnings groups—a 25 percent gap (42 percent versus 17 percent) for lower-middle earners, 22 percent for higher-middle earners, and 16 percent for high earners.

Columns (5), (6), and (7) show how effectively the CPP enhancements improve retirement income adequacy by calculating the changes in the proportion within the LSRR ranges after the CPP enhancement. The consistent negatives in column (5) indicate that there is an improvement in retirement adequacy across the earnings groups. Column (6) shows the increase in the proportion of Canadians within the ideal 80–120 percent range. The reduction in the proportion of Canadians inadequately prepared for retirement (column (5)) reflects a greater proportion of Canadians being adequately prepared (column (6)), but it also causes more Canadians to improve their living standards after retirement to a greater extent than potentially necessary (column (7)). For example, for lower-middle earners with fewer than 15 years of pension plan participation, there is a 13 percent reduction in the proportion inadequately prepared for retirement (column (5)), which is accompanied by four percent of the population becoming adequately prepared in column (6) and nine percent becoming overly prepared in column (7). Lower-middle earners with greater than 15 years of pension plan participation, on the other hand, have a substantial reduction of nine percent no longer being inadequately prepared in column (5), but the CPP enhancements move an additional four percent of the population out of the adequately prepared group (column (6)), putting a total of an extra 13 percent of the population in the overly prepared category (column (7)).

The potential for the involuntary CPP enhancement to cause Canadians who would have otherwise been adequately prepared for retirement to become over-prepared is not necessarily helpful (the positive values

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[19] It is important to note that, by measuring at a family and not an individual level, we find that a married woman will have the same LSRR as her husband, since spouses are treated as pooling their financial resources, which collapses many of the differences between the genders under any metric. Second, the LSRR is not a risk metric, and therefore it does not account for post-retirement risks, where women most often have more exposure owing to their greater longevity.

in column (7)). While improved living standards in retirement are attractive, the cost of these improvements is a reduction in living standards during one's working life.

On the other hand, nearly all of these impacts are subdued by behavioural responses in columns (8), (9), and (10). These reduced impacts include fewer Canadians being moved into the range of improved living standards (>120 percent). Recall that in this scenario, everyone not in an integrated pension plan reduces his or her RRSP savings (where applicable) in exact parallel with his/her increase in CPP contributions. It is possible that, therefore, the behavioural response will be more individualized than that assumed in this study, which will create better outcomes. Specifically, Canadian workers who feel adequately prepared for retirement will be the ones who will comfortably reduce RRSP savings, possibly even more than dollar-for-dollar, given that the CPP income is defined and guaranteed. It is possible that only those who feel adequately prepared will stop saving elsewhere, and that the behavioural response will thus help the CPP obtain a more targeted impact of moving more Canadians in the ideal range (and fewer into the >120 percent range).

The low-earner group has markedly different outcomes than the other earnings groups. Note that this group consists of those Canadians who, during their working lives, on average fell below what is considered the Canadian poverty line. Column (4) suggests that living standards for this group generally improve after retirement due to public pensions (considering the bolded numbers in column (4), 50 percent of the low-earning population is in the overly prepared category, which is approximately double that of the other earning groups). The CPP enhancements further increase the number of poor Canadians who will have elevated living standards as seniors. Whether low-income seniors should have higher living standards than the working poor is outside of the scope of this study. Overall, a comprehensive poverty study is the best means by which to understand this unique group and its particular needs before and after retirement.

Table 7a

Distribution of living standards replacement by earnings group, employer pension plan participation, and gender (adult-equivalent, family-based measure)—see Eq. (1).

2070-2074 "Retirement" Cohort		Scenario "Original CPP"			Scenario "Enhanced CPP"			Scenario "Enhanced CPP with Behavioral Responses"		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Proportion of Population with LSRR			Change in Proportion of Population			Change in Proportion of Population		
	% of Population	<80%	80-120%	>120%	<80%	80-120%	>120%	<80%	80-120%	>120%
Low Earners (<50% YMPE)	20%	13%	37%	50%	-5%	-3%	8%	-4%	-2%	6%
Gender										
Males	43%	13%	37%	50%	-5%	-3%	8%	-5%	-2%	7%
Females	57%	13%	37%	50%	-4%	-3%	7%	-4%	-2%	6%
Employer Pension Plan Participation										
<15 years	84%	15%	38%	48%	-5%	-2%	7%	-5%	-1%	6%
>15 years	16%	5%	35%	60%	-3%	-8%	10%	-2%	-5%	7%
Lower-Middle Earners (50-100% YMPE)	35%	30%	41%	28%	-11%	0%	11%	-9%	1%	7%
Gender										
Males	46%	31%	39%	30%	-10%	0%	11%	-8%	1%	8%
Females	54%	29%	44%	27%	-11%	1%	11%	-9%	1%	7%
Employer Pension Plan Participation										
<15 years	54%	42%	36%	22%	-13%	4%	9%	-11%	4%	7%
>15 years	46%	17%	48%	36%	-9%	-4%	13%	-7%	-2%	8%
Higher-Middle Earners (100-150% YMPE)	25%	35%	41%	24%	-12%	3%	9%	-8%	2%	6%
Gender										
Males	49%	36%	39%	25%	-11%	2%	9%	-8%	2%	6%
Females	51%	35%	43%	22%	-13%	3%	9%	-9%	3%	6%
Employer Pension Plan Participation										
<15 years	33%	50%	31%	19%	-13%	6%	7%	-11%	5%	5%
>15 years	67%	28%	46%	26%	-11%	1%	10%	-8%	2%	7%
High Earners (>150% YMPE)	20%	44%	34%	22%	-9%	4%	6%	-6%	2%	4%
Gender										
Males	53%	46%	31%	23%	-9%	3%	5%	-6%	2%	3%
Females	47%	41%	37%	22%	-10%	4%	6%	-7%	3%	4%
Employer Pension Plan Participation										
<15 years	26%	56%	26%	19%	-9%	4%	5%	-7%	3%	4%
>15 years	74%	40%	36%	24%	-9%	3%	6%	-7%	3%	4%

I will now focus on Canadians without workplace pensions, since they are often characterized as vulnerable in terms of retirement financial preparedness and were likely an important driving force behind the CPP expansions. There is a noticeable disparity between the retirement preparedness of Canadians with and without meaningful workplace pension plan participation across earnings groups. This disparity is most evident for lower-middle earners, where 42 percent without meaningful workplace pension are inadequately prepared for retirement (LSRR<80 percent), while only 17 percent of those with meaningful workplace pension are inadequately prepared.

Table 7b summarizes the results for workers with and without significant workplace pension plan participation (not including low earners, a group whose results are unique and have already been discussed). The overall impact of the CPP enhancements reduces the proportion of the population considered unprepared for retirement from approximately 46 percent to 34 percent. Given that this group was likely an important motivator behind the enhancements, this is a positive outcome. Nevertheless, 34 percent continues to be high, and cause for concern. This table also stresses the impact of the CPP enhancements in moving nine percent of workers into the >120 percent LSRR in column (7), an unfavourable outcome since it comes at the expense of reduced working-life consumption. This result is somewhat mitigated, reduced to six percent, by behavioural responses in column (10).

Table 7b
Distribution of living standards replacement for lower-middle earners, higher-middle earners, and high earners with and without meaningful pension plan participation (more than or fewer than 15 years) (adult-equivalent, family-based measure)—see Eq. (1).

2070-2074 "Retirement" Cohort	(1)	Scenario "Original CPP"			Scenario "Enhanced CPP"			Scenario "Enhanced CPP with Behavioral Responses"		
		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Proportion of Population with LSRR			Change in Proportion of Population			Change in Proportion of Population		
	% of Population	<80%	80-120%	>120%	<80%	80-120%	>120%	<80%	80-120%	>120%
Lower-Middle, Higher-Middle, and High Earners (>50% YMPE)	80%	35%	39%	25%	-11%	2%	9%	-8%	2%	6%
Employer Pension Plan Participation										
<15 years	40%	46%	33%	21%	-12%	5%	8%	-10%	4%	6%
>15 years	60%	28%	44%	29%	-10%	0%	10%	-7%	1%	6%

SECTION 5: CONCLUSION

This study used a population microsimulation model to project the implications of the CPP enhancements at full maturity (far into the future to years 2070–2074) in terms of (1) their net impact on retirement income flows, and (2) how well they help to support working-life living standards of Canadians in retirement.

This study found that the proportion of the enhanced CPP benefit that will make its way into the pockets of Canadian seniors as additional net income was reasonably consistent across earnings groups. As anticipated, the results showed that the enhanced CPP benefit for low-earning workers will be offset by reduced GIS benefits (decreasing the net income retained from the CPP enhancement by 42 percent), while high-earning workers will lose nearly the same proportion on account of higher taxes and lost OAS benefits (resulting in a 41 percent reduction in the mean gross benefit). Future work could carry out a fuller evaluation of "net impact" on Canadians at different earning levels by including the contributory side as well as the payout of the CPP enhancements, such as by computing the net "rate of return" that workers with varying earning histories receive on the enhanced CPP contributions.

This study found that the CPP enhancements should help Canadians maintain or improve their working-life living standards after retirement. This is particularly true for middle-earning Canadians without significant employer registered pension plan participation during their working lives, where the proportion determined unprepared for retirement dropped 13 percentage points as a result of the CPP enhancements (assuming no other changes). This is a positive outcome given that this group was likely a motivator behind the CPP enhancements. Nevertheless, aside from lower-income workers, over a third of Canadians continue to be unprepared to sustain living standards in retirement.

One concern is that the CPP enhancements will push already sufficiently prepared Canadians into being overly prepared for retirement, and that the new contributions will create unnecessary reductions in living standards during their working lives. If Canadians who are already adequately prepared, however, reduce voluntary personal savings elsewhere in response to the new CPP contributions, such behaviour will help the CPP enhancements achieve a more targeted impact by moving more Canadians into the ideal range of retirement income adequacy. This study recommends that government take initiatives to inform Canadians

better of their anticipated retirement income resources. A concrete example is the UK initiative "Pensions Dashboard," which was created as a partnership between government and industry to consolidate retirement income informational resources for individuals to access this information easily.[20]

ACKNOWLEDGMENTS

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[20] https://pensionsdashboardproject.uk
http://www.origo.com/services/PensionsDashboard/Pension_Dashboard.aspx

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APPENDIX A: LIFEPATHS—TOOL OF ANALYSIS

Statistics Canada's LifePaths is one of the world's largest dynamic microsimulation models of society. By integrating many data sets within Statistics Canada, LifePaths builds entire synthetic populations by simulating the detailed life courses of virtual Canadians, case by case. These virtual individuals attend school, make educational choices, leave home, form families, migrate, become parents, divorce and remarry, lose and find jobs, earn money, acquire homes, save, pay taxes, contribute to pension schemes, receive benefits and pensions, become disabled, and eventually die. LifePaths simulations aggregate to historical data over the past half-century and allow for detailed projections into the future (projections that incorporate the realistic complexity and diversity both across individuals and within life courses).

LifePaths integrates a tremendous amount of microdata and aggregate data in its behavioural equations and other modelling elements in order to faithfully reproduce the historical socioeconomic experience of Canadians. The model simulates detailed and diverse individual life courses using a variety of statistical methods, with particular emphasis on statistical event-history equations estimated from a broad array of data sources. Microdata with a longitudinal component are taken advantage of wherever possible. Key data sources that are used to develop the model are historical demographic estimates of population, immigration, emigration, fertility, mortality, census microdata from 1971 to 2006, longitudinal Labour Force Survey (LFS) data from 1976 to 2005, Family History surveys from 1984 to 2001, administrative data on postsecondary education, the 1999 and 2005 Survey of Financial Security (SFS), and longitudinal and/or cross-sectional taxation data from 1980 to 2011. Many other data sources have also been used to a lesser degree. Other than the exceptions noted, the scenario underlying the main results of this report is the "default" LifePaths scenario, which generally assumes the continuation of recently observed socio-economic outcomes.

Large-scale dynamic population microsimulation models are increasingly the tool of choice by policy makers throughout the industrialized world for public policy analysis, including future retirement income system outcomes and impact of pension system changes – in addition to Statistics Canada's LifePaths, examples include APPSIM in Australia (Harding, 2007), CBOLT in the United States (O'Harra, Sabelhaus and Simpson, 2004), and MIDAS in Belgium (Dekkers and Belloni, 2009). Interested readers are directed to Li and O'Donoghue (2013) for a recent survey of dynamic microsimulation models internationally, including their uses, model structure and methodology.

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About the Society of Actuaries

The Society of Actuaries (SOA), formed in 1949, is one of the largest actuarial professional organizations in the world dedicated to serving more than 30,000 actuarial members and the public in the United States, Canada and worldwide. In line with the SOA Vision Statement, actuaries act as business leaders who develop and use mathematical models to measure and manage risk in support of financial security for individuals, organizations and the public.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on health care, retirement and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

Objectivity: The SOA's research informs and provides analysis that can be relied upon by other individuals or organizations involved in public policy discussions. The SOA does not take advocacy positions or lobby specific policy proposals.

Quality: The SOA aspires to the highest ethical and quality standards in all of its research and analysis. Our research process is overseen by experienced actuaries and nonactuaries from a range of industry sectors and organizations. A rigorous peer-review process ensures the quality and integrity of our work.

Relevance: The SOA provides timely research on public policy issues. Our research advances actuarial knowledge while providing critical insights on key policy issues, and thereby provides value to stakeholders and decision makers.

Quantification: The SOA leverages the diverse skill sets of actuaries to provide research and findings that are driven by the best available data and methods. Actuaries use detailed modeling to analyze financial risk and provide distinct insight and quantification. Further, actuarial standards require transparency and the disclosure of the assumptions and analytic approach underlying the work.

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