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PENSION PAPERS

Canada's Looming Retirement Challenge:

Will Future Retirees Be Able to Maintain Their Living Standards upon Retirement?

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In this issue...

The authors provide insights into Canadians' state of retirement preparedness, not only across income groups, but also within them.

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The Study in Brief

A key question in Canada's pensions debate is whether Canadians will be able to maintain their living standards in retirement, and if policy needs to respond to the risk that some will experience painful declines.

To date, it has been very difficult to estimate how current trends might affect various members of the population in the long run. In this study, we used LifePaths – a sophisticated simulation tool developed at Statistics Canada which integrates a large amount of data on the socio-economic experience of Canadians – to project consumption before and after retirement for Canadians who have not yet reached retirement age. In addition to income from public pension programs, LifePaths integrates saving in and income from registered pension plans (RPPs) and registered retirement savings plans (RRSPs), and also tracks the accumulation of equity in housing and its support for consumption later in life.

What makes LifePaths particularly valuable is its ability to model time-varying demographic and socio-economic patterns on diversified and representative people of various ages over time. This study focuses on future retirees' ability to maintain their pre-retirement consumption after they cease working – benchmarking each individual's living standards after retirement to their situation before it – taking into account the diversity and variability of income, taxation, saving, employment, and family situations over a lifetime. Importantly, it gives insights in to state of retirement preparedness, not only across income groups, but also within them.

Consistent with other research, the study finds that Canada's retirement system has supported post-retirement consumption relatively well, especially for lower-income individuals and those who reached retirement age in the last twenty years. If ongoing behavior and economic circumstances were to persist indefinitely, however, more Canadians may find maintaining their working-life consumption in retirement more difficult. While only about 16 percent of recent retirees are in circumstances that imply a substantial reduction in consumption post-retirement, the persistence of recent trends would raise this number over time: 44 percent of current 25- to 30-year-olds – and a substantial majority of those in the two upper income quintiles – would risk a marked reduction in their standard of living after retirement. Key factors behind this projected increase in risk are the fact that Old Age Security benefits, being indexed to inflation, are projected to lag productivity-driven increases in earnings and the declining share of private-sector workers participating in RPPs. This trend is robust to differing assumptions within reasonable ranges for future real wage growth, inflation, rates of return, RPP coverage and saving rates.

In short, if existing trends and behavior continue, the number of working Canadians at risk of a significant drop in their living standards in retirement will rise over time. Since, the projection results vary substantially among generations, earnings groups, and sources of income, however, policymakers need to assess how the retirement prospects of various groups would change in response to reforms that seek to mitigate that risk.

Whether Canadians are on a path to maintain their living standards in retirement – taking into account public-pension benefits, benefit accruals in registered pension plans, and purely individual saving – is the largely unanswered question in Canada's pensions debate.

By international standards and, notwithstanding the recent financial crisis, compared to the past, Canada's stock of tax-deferred saving in registered pension plans (RPPs) and registered retirement savings plans (RRSPs) is large. Whether, in combination with other sources of retirement income, it is large enough to satisfy Canadians' expectations for living standards in retirement is hard to say, however. Even if we knew what those expectations are, we have typically been forced to rely on aggregate, average assumptions about people's future employment and earnings trajectories, saving rates, rates of return, and potential withdrawals to judge what individual or aggregate stocks of assets will be when the time comes to begin drawing them down.

The uncertainties involved in assessing aggregate retirement savings are an order of magnitude worse when it comes to assessing the prospects for subsets of the Canadian population. Statistics Canada's Survey of Financial Security has provided two snapshots in the last 25 years – in 1999 and 2005 – of the retirement saving and pension entitlements of people of various ages and incomes. Regular surveys of this type, with large enough samples, especially if linked to data on individual earnings histories, would go a long way to providing the information necessary to evaluate the adequacy of Canadians' retirement saving with more confidence, including that of particular subpopulations. Unfortunately, no such information exists.

This ignorance matters enormously. There is widespread concern that Canadians are not saving enough and that their standards of living may drop significantly in retirement. If rates of return remain at levels such as we have recently seen on yields on high-quality debt securities, the saving rates needed to achieve standard benchmarks for income replacement will indeed be very high.[1] Yet the aptness of these standard benchmarks in general, or for specific groups, is doubtful, and policies to respond to this concern need a better knowledge base.

This paper employs a new tool – Statistics Canada's LifePaths model – to simulate the careers, lifetime saving, and retirement income of Canada's population with a high degree of detail and to project potential consumption possibilities for future retirees. Its focus is on people's ability to consume in retirement compared to their actual consumption during their working lives – thus it is a relative measure that takes each individual's pre-retirement consumption as the standard. It finds that, while only about 16 percent of recent retirees are in circumstances that imply a substantial reduction in their standard of living after retirement, the persistence of some recent trends into the future could result in sizeable declines in consumption possibilities as time goes by; in fact, fully 44 percent of current 25- to 30-year-olds are on track to experience a marked reduction in their standard of living after retirement. The most prominent factors for this projected declining trend are the failure of OAS benefits to follow the growth of household earnings, plus an ongoing trend of fewer private sector workers enjoying coverage under registered pension plans.

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1 Dodge, Laurin, and Busby (2010) estimated that most Canadians, should they wish to retire at age 65 and replace 70 percent of their working incomes, will need to save from 10 to 21 percent of their pre-tax earnings every year if they save for 35 years.

Because Old Age Security (OAS) and the Guaranteed Income Supplement (GIS), along with the C/QPP, protect lower-income Canadians from substantial declines in their standards of living in retirement,[2] the people these trends highlight as most at risk of sizeable declines in consumption after they finish work are those middle- to high-income individuals who rely on voluntary savings to the greatest extent. It also turns out, however, that many at the lower end of the income spectrum could also be at risk: although the proportion of newly retired seniors in the lowest pre-retirement earnings quintile who have consumption-replacement rates of less than 75 percent is currently almost nil, these projections show that proportion approaching 20 percent by 2050.

The sensitivity of projections this far into the future to assumptions inevitably makes these conclusions somewhat speculative. The principal finding of this study, however – that is, a projected gradual increase in the proportion of future retirees likely to experience a significant decline in their standard of living upon retirement – persists even with differing assumptions for future real wage growth, inflation, rates of return, RPP coverage, and future saving rates.

If policymakers judge that risks of large drops in living standards for various groups in the population constitute a public-policy problem, reforms should address behaviour and outcomes across much of the earnings spectrum.

Pre- and Post-Work Living Standards of Currently Retired Canadians

A review of what we know about the relative living standards of Canadians who retired in the past is a reasonable starting point for exploring what may happen to currently working Canadians when they leave employment. In aggregate, the picture is bright for current retirees.

The incidence of low-income among Canadian seniors is low – some 4 percent of retirees, compared to 13 percent among OECD countries on average. In addition, the average disposable income of the Canada's elderly population is 91 percent of that of the total population, which is among the highest in OECD countries (OECD 2009).

While these measures do not speak to whether Canadian retirees have been able to maintain their standard of living in retirement, a relatively bright picture also emerges from a recent statistical analysis of post- versus pre-retirement incomes of Canadian families. Using a rich database of individuals tracked over a period of 20 years, LaRochelle-Côté, Myles, and Picot (2008) showed that, on average, lower-income people experienced little change in disposable income as they moved into retirement. Middle-income individuals were able to replace about 70 percent of peak after-tax working-age income, while top earners replaced about 60 percent on average. Looking at family incomes, which is appropriate if consumption is shared among household members, they found that replacement rates were generally 10 percentage points higher.

This same study, however, noted considerable variation in the retirement income of retirees with similar working-life disposable incomes. Among individual retirees aged 69–71 with above-average working-life income, more than a quarter had replacement rates lower than 60 percent. Those able to achieve higher replacement rates usually relied on some employment earnings early in retirement (and that raises obvious questions about what retirement actually means for such people), supplemented by investment income and, in later retirement, income from private pensions.

That finding highlights another important difference in the postwork circumstances of Canadians with different sources of income.

2 We should note that the fact that low-income workers are generally able to replace a high proportion of their working-life consumption in retirement does not imply their standards of living in retirement are any more adequate to their needs than they were in the course of their working lives.

Ostrovsky and Schellenberg (2009) found that, on average, people with no or low RPP coverage were likely to more than make up for that lack with earnings from employment or self-employment and with income from non-registered financial investments. But these findings demonstrate the risk of relying on average measures when there is a lot of variation around the average and the distribution is not symmetrical. Subsequent research (Ostrovsky and Schellenberg 2010), which examined distributions of replacement rates, showed that the typical experience, that is, the median replacement rate, of people with RPP coverage was significantly better than of those without it.

Is the experience of current retirees a reliable guide to the future? Horner (2009) looked at current saving patterns to estimate what future incomes in retirement may look like, and he found that about 30 percent of modest- to high-income households are not likely saving enough to avoid a significant drop[3] in their standards of living in retirement. While Horner's work looked at home equity, small-business equity, and non-registered savings assets, each of which is important for some retired individuals (Brown, Hou, and Lafrance 2010; Ostrovsky and Schellenberg 2009), the available data make it difficult to draw strong conclusions about these factors.

Since Horner's study relied on a single year of cross-sectional tax data, it required strong assumptions about the rest of an individual's career, both the past and the future; essentially it assumed that an individual's earnings, RPP coverage, contributions to RRSPs, and family demographics in 2006 are fully representative of his or her entire career. But one year's data cannot properly capture the dynamics and diversity of a person's actual life course. Actual retirement income is a cumulative function of an individual's employment, earnings, RPP coverage, and individual savings over an entire career, and there is often tremendous variability in each of these factors.

Not enough is known about Canadian workers' cumulative retirement saving to date, but their future saving behaviour is even more uncertain. It is often assumed that current behaviour will continue. However, in order to make projections of future retirement saving and its adequacy, it is critical to have an appreciation of the underlying cohort trends relating to employment, earnings, and saving in various forms; simply extrapolating current saving outcomes may not be appropriate.

The declining trend in RPP coverage and the shift from defined-benefit to defined-contribution or hybrid plans for those with coverage, for example, may mean that pensions are more fully funded and thus likelier to be paid; however, from the individual retiree's point of view, they make future retirement income (rather than contributions from current workers) sensitive to financial-market volatility and investment returns. The recent advent of TFSAs will also very likely play an increasingly important role in shaping the saving behaviour of working Canadians. That is because, for many taxpayers, TFSAs are a more tax-efficient retirement-saving vehicle than traditional tax-deferred accounts (Laurin and Poschmann 2010).

In addition to the deficiencies in our knowledge about the existing retirement savings of Canadian workers, and the uncertainties associated with projecting their future saving, there are broad uncertainties about the future of the economy, such as wage growth, rates of return, and inflation, as well as uncertainties about future government policy.

Many economists expect that as population aging restrains the growth of labour supply in years ahead, GDP growth will be slower than in recent decades. The demographic shift may also depress rates of return on real and financial assets. Firstly, returns on investments are in the long term

3 Defined as the proportion of households likely unable to replace, in retirement, at least 90 percent of estimated consumption pre-retirement (Horner 2009, see Table 4.5).

Box 1. Data Sources for LifePaths

LifePaths integrates a tremendous amount of microdata and aggregate data on the socioeconomic experience of Canadians. Key data sources used to develop the model are historical demographic estimates of population, immigration, emigration, fertility, and mortality, census microdata from 1971 to 2006, longitudinal Labour Force Survey 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 2007. Many other data sources have also been used to a lesser degree.

For the simulation of retirement income and the determination of consumption replacement outcomes, an individual's earnings history is particularly important. The streams of lifetime saving and the corresponding accumulation of wealth in an individual's RRSPs and/or RPPs and in the form of home equity are also crucial components of such an evaluation. The key data underlying the equations that produce individual earnings histories in LifePaths are a longitudinal version of the 1976-2004 Labour Force Surveys, and census data from 1981 to 2001. The resulting earnings histories have been calibrated and validated using various longitudinal tax data sources.

The likelihood that a simulated individual accrues benefits in an RPP during his or her lifetime, and the size and characteristics of those benefits, are modelled from a number of data sources. Equations linking the socioeconomic characteristics of individuals and their likelihood and type of RPP coverage have been estimated from the 1999 SFS. The number of individuals accruing an RPP benefit in a given year, broken out according to birth cohort, age, and earnings, has been established from taxation microdata from 1991 to 2006, supplemented by data from the Pension Plans in Canada Survey from 1977 to 2007 The 1971 to 1996 censuses have been used to infer trends in RPP coverage for older cohorts.

LifePaths' modelling of RRSP saving and accumulation relies on longitudinal tax microdata on RRSP contributions and withdrawals from 1990 to 2001 and on cross-sectional tax microdata from 1968 to 2007. Gross market rates of return to various asset classes have been taken or derived from Statistics Canada's CANSIM database, Tables 176-0041 and 176-0043, "Financial Market Statistics." Differences between gross market rates of return and those actually received by individuals have been estimated by roughly calibrating aggregate RRSP stocks to be consistent with the SFS for 1999 and 2005. The distributions of household RRSP wealth produced by LifePaths have been validated using data from the 1999 and 2005 SFS.

The retirement income received by individuals from RPPs and RRSPs in LifePaths' simulations has been validated with taxation data from 1990 to 2006.

LifePaths' modelling of home ownership and home equity relies on 1981 to 2006 census data, linked longitudinal income-tax and property-tax assessment data, and the 1999 and 2005 SFS.

Sources: Statistics Canada LifePaths Model and authors' calculations.

dependent on real economic activity, which again is likely to grow at a slower pace with an ageing workforce. Secondly, an ageing population also means that the pool of individuals living on retirement income – and thus, on average, net sellers of assets – will expand at a faster pace than the pool of younger workers, who are net buyers of assets. This demographic effect on asset markets may dampen future rates of return (Takáts 2010).

The LifePaths Model

Statistics Canada's LifePaths microsimulation model provides important insights into this research question and overcomes many limitations of the existing research. LifePaths can robustly project the retirement incomes from public and registered sources, and home equity, for past and future retirees and can identify individuals likely to experience a significant decline in their standard of living after retirement. It is also a powerful tool for evaluating the importance of key risks and uncertainties.[4]

LifePaths is a publicly available microsimulation model of individuals and families, designed primarily for analysis and development of government policies that have a longitudinal dimension. It creates detailed individual life histories by using behavioural equations estimated from a wide variety of household survey and administrative data (described in Box 1). The resulting synthetic population is representative of Canada's population and its historical evolution, is consistent with available microdata, and has been constructed to adequately reproduce aggregate population statistics.

4 LifePaths can also explore the impact of various policy changes, including the marginal impact after interactions with the rest of the tax and transfer system.

LifePaths models individual-level fertility, mortality, family demographics, education, employment, earnings, most taxes and transfers (including public pensions), savings in RRSPs and RPPs, and the accumulation of equity in owner-occupied homes. Rather than merely producing average results, therefore, it generates a range or distribution of individual outcomes.

LifePaths models individuals' retirement income and ability to maintain pre-retirement living standards for historical retirement cohorts by using socioeconomic parameters and behavioural equations estimated from several data sources. These successfully reproduce the actual historical experience of individual Canadians in detail and typically include cohort and period effects. Many assumptions underlie a projection scenario. Except where specific alternative assumptions are made, it has been generally assumed that future socioeconomic outcomes are consistent with the cohort trends visible in the most recent data.

LifePaths incorporates considerable detail on the historical evolution of various retirement-income programs and the income and payroll tax systems. For these projections, it is assumed that public pensions, and the income-tax and payroll tax systems, including the provisions for RPPs and RRSPs, will remain as currently legislated. Public-pension benefits and many elements of federal and provincial income taxes (tax brackets, tax credits, etc.) remain indexed to the consumer price index (CPI). The yearly maximum limit for pensionable earnings under the CPP and QPP (YMPE) continues to be indexed to the growth of the average industrial wage.

The following assumptions in the projection scenario chosen for this study are of particular note:

- Real wages will grow at 1.3 percent annually (the assumption for real wage growth made by the Chief Actuary of Canada in the most recent *Actuarial Report of the Canada Pension Plan) (Canada 2010)*.
- CPI inflation will be 2 percent annually (reflecting the Bank of Canada's target).
- There will be a trend to lower private-sector RPP coverage and a continuing movement from defined-benefit to defined-contribution plans in the private sector.
- Future real-market rates of return of the various asset classes held by RRSPs and defined-contribution RPPs are based, as a starting point, on their historical averages over the last 72 years – roughly 4 percent in aggregate. In LifePaths, individuals receive a reduced rate of return, reflecting investment-management and other costs and individual-level performance penalties that are not well understood but are implied by the aggregate data on RRSP pre - retirement tax flows, market rates of return and RRSP wealth in the 1999 and 2005 Survey of Financial Security. The base assumption is that the net real rate of return received by individuals in the future is roughly 1 percent for RRSPs and 2.5 percent for defined-contribution RPPs.[5] Note that these are aggregate rates of return: LifePaths actually models portfolio composition and rates of return stochastically at the level of the individual.
- Individuals' homes appreciate at 2.65 percent (nominal) per year in the future, the midpoint between the assumptions for nominal inflation and nominal wage growth.
- Most homeowners will reach retirement age having largely paid off their mortgages (consistent with the distribution of home-equity ratios at age 65 in the 1999 and 2005 Survey of Financial Security).

We stress that these assumptions produce a conditional projection. If the future socioeconomic behaviour of younger workers, including their saving rates, is substantially different from that implied by historical and current trends, the results could be quite different from those projected in this study. For example, individuals' saving rates may change as people update their projections about their own retirement. We discuss the impact of some

5 LifePaths takes flows of RRSP contributions and withdrawals from longitudinal tax data prior to age 71 and applies net market rates of return to stylized RRSP portfolios to produce aggregate RRSP stocks. Reconciling the resulting RRSP stocks with those in the 1999 and 2005 Surveys of Financial Security suggested that rates of return within actual RRSP portfolios were lower than those on the assets of the stylized portfolios. The reasons for this gap are unclear.

alternative assumptions, including those for saving behaviour, at the end of the study, under "Sensitivities."

We should also note limitations with respect to the treatment of defined-benefit pension plans, including defined-benefit RPPs and the C/QPP. The funding status of these plans is not modelled in LifePaths. Our projections assume that future employee contributions and benefit levels will follow their historical trends and that any changes in employer contributions required to reconcile contributions and benefits will not affect current compensation or income growth. If rates of return stay persistently low, however, defined-benefit plans, including the C/QPP, would experience funding deficiencies. In that case, benefits would be lower than projected, thus lowering consumption in retirement, and/or contributions would be higher than projected, which might reduce pre-retirement consumption.

Benchmarking Living Standards in Retirement

Most discussions of living standards in retirement compared to those enjoyed during working life refer to gross earnings replacement. One commonly used rule of thumb is that a gross retirement income equal to roughly 70 percent of gross pre-retirement earnings allows individuals to maintain their standard of living after retirement. This rule is arbitrary and ignores the substantial differences among individuals in the relationship between gross income and consumption. LifePaths facilitates an attempt to measure individuals' consumption-replacement rates more directly. More specifically, consumption-replacement rates have been estimated in the following manner.

$$\text{Consumption-replacement rate} = \frac{\text{Potential retirement consumption}}{\text{Proxy for actual pre-retirement consumption}}$$

Potential retirement consumption is an individual's after-tax income, at age 70, from OAS, C/QPP, the GIS, RPPs, and RRSPs, plus the "imputed rent" from home ownership and the amortization of 50 percent of an individual's home equity. It does not include income from work: while employment income does support the consumption of many Canadian seniors, the explicit focus on living standards after work ceases precludes it as an income source. Although LifePaths does not model the timing of retirement per se, underlying trends produce increasing labour force participation after traditional retirement age in the future.

Proxy for actual pre-retirement consumption is gross earnings plus imputed rent, less payroll and income taxes, less net retirement saving in RPPs and RRSPs, less payments of mortgage principal. This is a "prime working age" measure of consumption; it averages each individual's "best" 15 years between ages 35 and 60 and is indexed for inflation.

As noted, both the replacement-rate numerator and denominator include a measure for imputed rent. People with equity in their homes enjoy a flow of income or consumption services, usually referred to as imputed rent, that should be recognized and included as a source of income or consumption; this study relies on the approach used by Brown, Hou, and Lafrance (2010) to estimate it. The amount of imputed rent received by an individual is a function of the size of his or her home equity; the 50 percent of home equity that is not already being amortized in the numerator provides a flow of imputed rent.

Both the numerator and denominator are calculated on a single-adult-equivalent basis by summing the values for the two spouses, where applicable, and then using an equivalency scale to adjust for family size (spouses plus dependent children).

Under "Sensitivities" we discuss the consumption-replacement-rate methodology further; we test the sensitivity of the findings to some alternative choices and assess the omission of

some elements of saving and net worth from the calculation of replacement rates.

The use of a proxy for pre-retirement consumption allows a straightforward target for individuals to avoid a reduction in their standard of living after retirement, that is, a consumption-replacement rate of 100 percent. Other studies have typically used thresholds of 100 percent or 90 percent in their analysis (Munnell, Webb, and Delorme 2006; Horner 2009). Some would consider full replacement of consumption in retirement from public pensions, registered sources and home equity as an overambitious goal. Cessation of work ends some expenses, and some argue that, whereas some costs increase with age, the net costs of many activities tend to decline. Moreover, some analyses of the CPI (for example, Rossiter 2005), which we use to convert nominal dollar amounts into real-consumption possibilities, suggest that it overstates increases in the cost of living, which would also justify using a more conservative replacement ratio. The use of a more conservative 75 percent replacement threshold also provides a counterbalance to the fact that some forms of saving are not explicitly incorporated into the analysis. These considerations, plus a sense that declines in living standards in retirement need to be significant to raise public policy concerns, leads us to use a consumption-replacement threshold of 75 percent as a benchmark for potentially disruptive declines in living standards in retirement.

The next section of the study evaluates the consumption-replacement outcomes of the Canadian retirement-income system by using LifePaths. We present results first for recent retirees, that is, those reaching retirement age between 2006 and 2010. Then the timeframe expands to encompass persons reaching retirement age between 1966 and 2050 in order to examine the historical and projected future evolution of potential consumption replacement in retirement.

We look at various consumption-replacement measures: average replacement rates, both by specific source of retirement consumption and overall, as well as entire distributions of replacement rates and the proportion of individuals below certain replacement thresholds, with particular emphasis on those with less than 75 percent replacement. An examination of the distribution of replacement rates allows a focus on subgroups of particular interest – in this case, those individuals at risk of low consumption replacement in retirement.

The Projections and Simulations

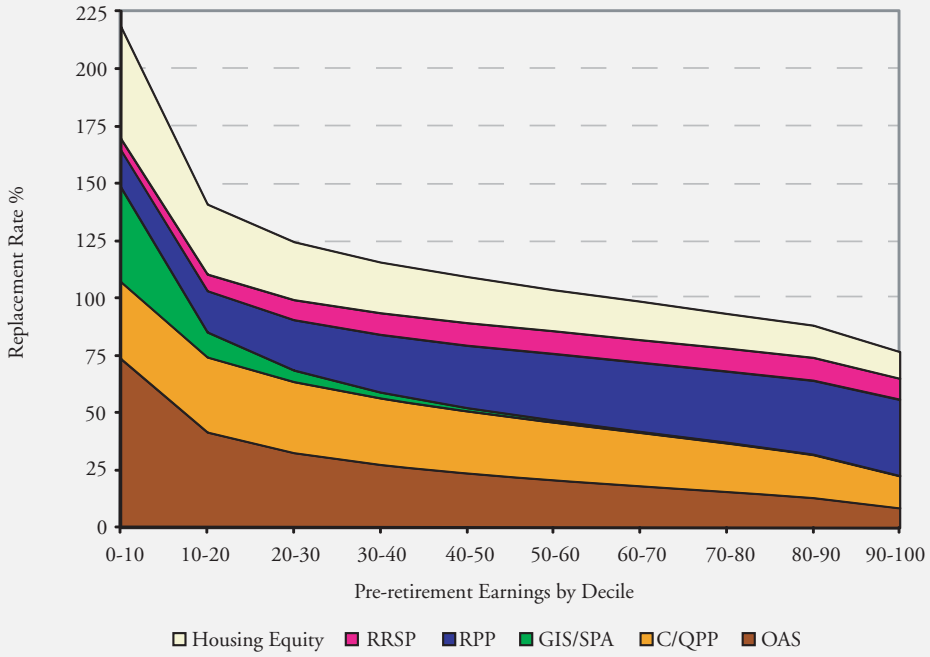
The 2006-2010 Retirement Cohort

Figure 1 shows the stacked average consumption-replacement rates by source and by pre-retirement earnings decile for recently retired workers, that is, those reaching age 66 between 2006 and 2010. Average total replacement rates for the bottom seven deciles of this cohort equal or exceed 100 percent. Average total replacement rates decline as pre-retirement earnings increase; they are well over 100 percent for the bottom deciles but fall to 77 percent for the top decile. Only average RPP replacement rates increase with earnings. Interestingly, average RRSP replacement rates are very flat across most of the pre-retirement earnings distribution. All public sources of retirement income and home equity provide replacement rates that fall with pre-retirement earnings.

As noted, average replacement rates obscure the underlying variability in the replacement rates of individuals. This is particularly true for single sources of retirement income. Figure 2 shows the distribution of replacement rates from RPPs for recent retirees with pre-retirement earnings between the 60th and 80th percentiles.

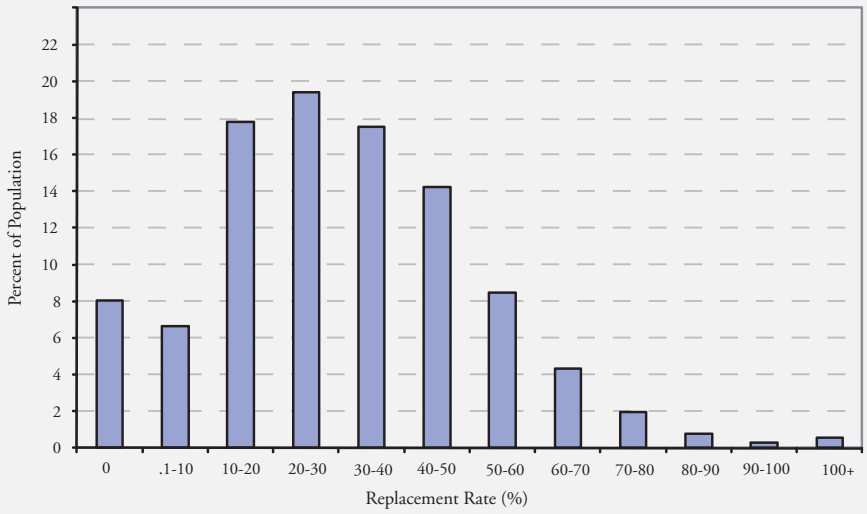
Fewer than a fifth of these individuals have RPP replacement rates of 50 percent or greater. Some 8 percent have no family income from RPPs, and the RPP replacement rates of the remaining individuals are widely distributed, most falling between 10 and 50 percent.

Figure1: Stacked Average Replacement Rates by Component and Pre-Retirement Earnings (2006-2010 Retirement Cohort)



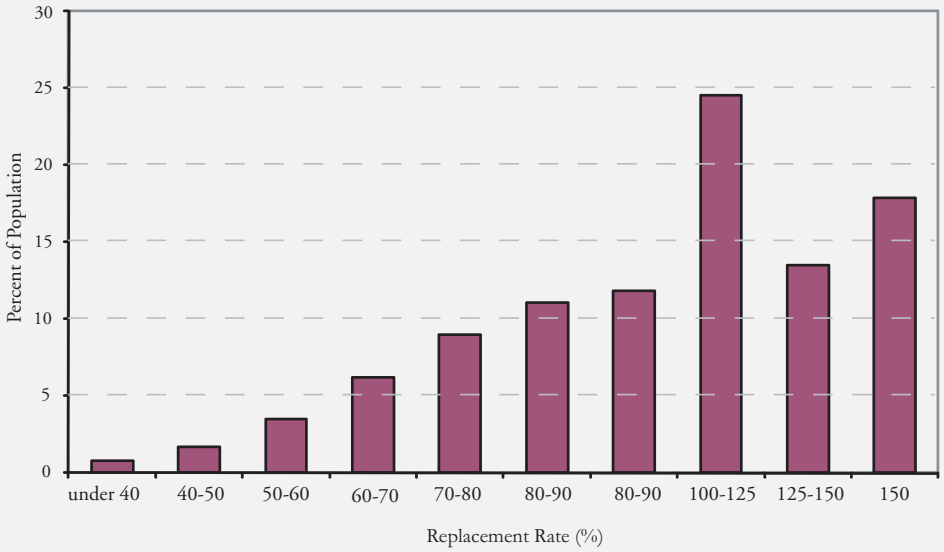
Sources: Statistics Canada LifePaths Model and authors' calculations.

Figure 2: Distribution of RPP Replacement Rates by Size (60th-to-80th percentile, 2006-2010 retirement cohort)



Sources: Statistics Canada LifePaths Model and authors' calculations.

Figure 3: Distribution of Total Replacement Rates by Size (2006-2010 Retirement Cohort)



Sources: Statistics Canada LifePaths Model and authors' calculations.

Figure 3 moves to the distribution of total replacement rates for all recent retirees. As one might expect, individual total replacement rates are somewhat less variable than those from single sources of retirement income since one source often offsets others. Nevertheless, significant variability remains.

More than half of recent retirees appear to be capable of maintaining their consumption after retirement, and a further sizeable minority are experiencing only a fairly modest reduction. Overall, roughly five in six individuals appear to have consumption possibilities of at least 75 percent, and four in five of at least 80 percent.[6]

Cohorts Retiring from 1966 to 2050

Average Replacement Rates

We now turn to historical and projected future trends in rates of consumption replacement provided by retirement income from public pensions, registered sources and home equity. Figure 4 shows the trends in the average replacement received from public pensions, broken out by retirement cohort and component. The vertical dotted line divides historical and future retirement cohorts. The average replacement rate from "all public pensions" increased steadily across cohorts reaching normal retirement age from 1966 to 1988 and peaked in 1988 at about 57 percent. It has since declined to 46 percent for recent retirees and is projected to continue declining for future retirees.

The dominant reason for the downward trend in the "all public pensions" replacement rate is the steadily declining replacement provided by OAS benefits. The pre-retirement consumption of these cohorts has increased steadily in real terms over the past 50 years, a trend that is projected to continue (albeit more modestly) thanks to increasing labour-market participation by women and assumptions of future wage growth that outpaces inflation.

The other trend of particular note is the substantial increases in average rates of replacement provided by C/QPP for cohorts reaching retirement age from 1966 to 1988;

6 This finding seems reasonably consistent with those of other studies for recent retirees, notably LaRochelle-Côté, Myles, and Picot (2008) after adjusting for the different replacement measures (i.e., after-tax income replacement versus consumption replacement).

Figure 4: Average Public Pension Replacement Rates by Component and Retirement Cohort, 1966-2050

Sources: Statistics Canada LifePaths Model and authors' calculations.

for these cohorts, this trend more than offset the declining OAS replacement rates and produced increasing "all public pension" replacement rates. This increase in C/QPP replacement rates across these cohorts was caused by the phase-in of full CPP benefits during the plan's first decade of operation and the equivalent for QPP benefits over two decades, in combination with rapid expansions of the YMPE between 1974 and 1986. But for cohorts reaching retirement age since 1988, the average C/QPP replacement rate has been gradually declining, a trend which appears to reflect the fact that individuals are entering the workforce later than previously and leaving it earlier. Average C/QPP replacement rates are projected to continue declining modestly for cohorts retiring over the next 20 years. The forthcoming changes in the actuarial adjustments for early or late take-up of C/QPP benefits have not been modelled.

Similar measures are shown in Figure 5 for the other components of the retirement-income system modelled in LifePaths: RPPs, RRSPs, and home equity. It should be recalled that the replacement rate from home equity includes both the stream of consumption or "imputed rent" received by homeowners and the assumed drawdown of 50 percent of a homeowner's equity, amortized over the course of his or her retirement.

Average combined consumption replacement from these sources increased steadily over the historical period, from a low of some 35 percent for the earliest retirement cohorts shown to a recent high of 56 percent. However, this trend is projected to reverse for all future retirement cohorts, with combined replacement rates dropping steadily and reaching 45 percent for individuals who reach retirement age in 2050.

Several factors underlie this projected decline. Average RPP replacement rates rose steadily across historical retirement cohorts, peaking at 30 percent for the 2001-5 cohort; they decline modestly for the most recent retirement cohort and are projected to continue declining for future cohorts and to reach a floor at roughly 20 percent for cohorts reaching retirement age after 2040. These trends reflect the observed expansion and then contraction of RPP coverage of the labour force over the historical period, as well as the assumption that future private-sector RPP coverage will continue to decline moderately.

The historical and projected trends in home-equity replacement rates reflect historical trends and future assumptions for home ownership, home prices, and mortgage debt at retirement.

Figure 5: Average Replacement Rates from RPPs, RRSPs and Housing Equity by Retirement Cohort, 1966-2050

Sources: Statistics Canada LifePaths Model and authors' calculations.

It has been assumed that home-ownership rates will remain at recent levels, that home prices will increase annually by the midpoint of inflation (2.0 percent) and nominal wage growth (3.3 percent), and that the majority of homeowners in future retirement cohorts will reach retirement with little or no remaining mortgage debt (as did retired individuals in the 1999 and 2005 Survey of Financial Security).

In part, the historical trend of increasing average RRSP replacement rates is due to the ongoing maturation of this program after its introduction in 1957. Successive retirement cohorts have access to RRSP saving over progressively larger portions of their careers. In addition, annual RRSP participation rates increased steadily after the introduction of the program, especially in the early to mid-1990s, following a comprehensive reform of RRSP limits. The flattening of average RRSP replacement rates for recent and future retirees reflects the moderation in RRSP saving observed in the past decade; these projections assume that these recent levels of RRSP participation will continue into the future.

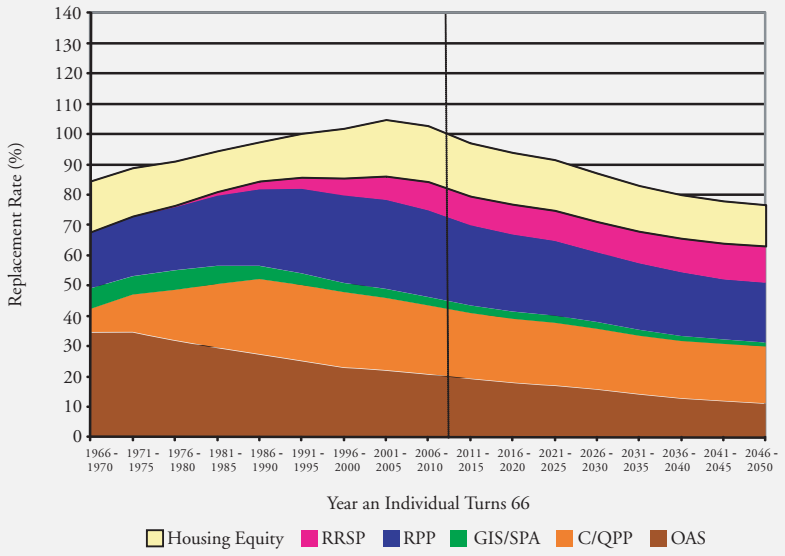
The average replacement rates from all these separate components are stacked in Figure 6 to provide a comprehensive picture of the trends in total replacement rates and their composition.

Average total replacement rates increased steadily across cohorts retiring in the historical period, peaking at roughly 105 percent for the 2001-5 cohort. The average total replacement rate declined slightly for the most recent retirees. Integrating existing data on current workers' socioeconomic experience to the present with projections of the remainder of their lifecourses, based on historical and current trends, yields steady and substantial declines in replacement rates for future retirement cohorts, falling to roughly 75 percent for individuals reaching retirement age in 2050.

Distribution of Replacement Rates

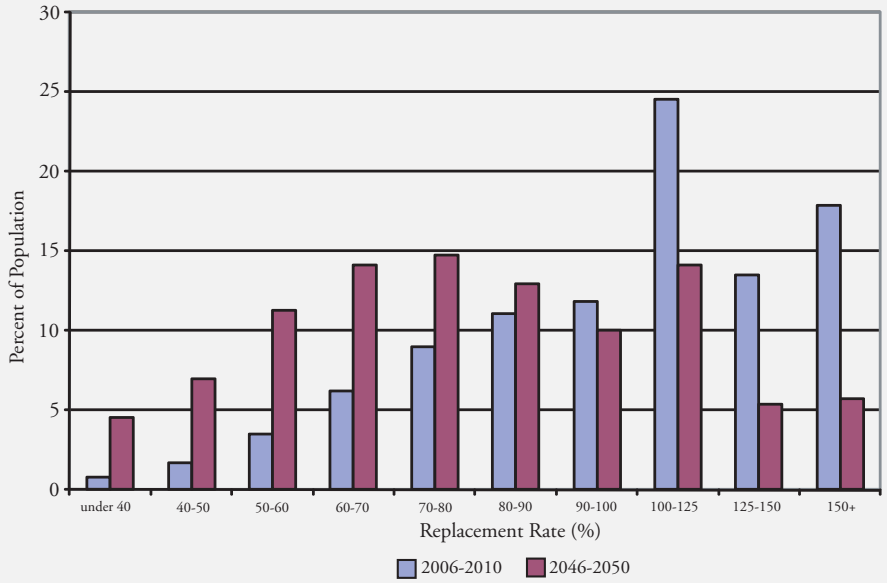
Figure 7 compares the distribution of total replacement rates for the 2006-2010 retirement cohort with that projected for the 2046-50 cohort. The contrast is stark. Only 25 percent of the 2046-50 retirement cohort are projected to have replacement rates from public pensions, registered sources, and home equity of 100 percent or greater, compared to 55 percent of the 2006-10 retirement cohort. Making reference to our 75-percent benchmark for potential consumption replacement from these sources, more than four in ten individuals in the 2046-50

Figure 6: Stacked Average Replacements Rates by Component and Retirement Cohort, 1966-2050



Sources: Statistics Canada LifePaths Model and authors' calculations.

Figure 7: Distribution of Total Replacement Rates by Size and Retirement Cohort



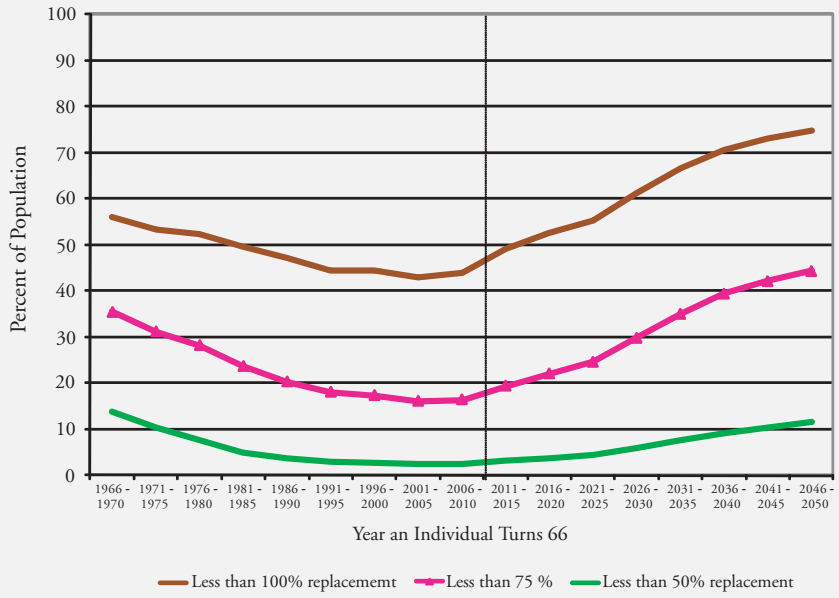
Sources: Statistics Canada LifePaths Model and authors' calculations.

retirement cohort are projected to experience a drop in consumption possibilities larger than 25 percent, compared to only about one in six individuals in the 2006-10 cohort.

This analysis is extended across all retirement cohorts in Figure 8. Since it is difficult to show the complete distribution of replacement rates across many cohorts, we show more summary measures, namely, the proportions of individuals with a total replacement rate under three different thresholds – 100 percent, 75 percent, and 50 percent.

Since, for the reasons elaborated above, a consumption-replacement rate of less than 100 percent does not necessarily indicate a meaningful

Figure 8: Proportion of Population Falling Below Various Total Replacement Rate Thresholds by Retirement Cohort, 1966-2050



Sources: Statistics Canada LifePaths Model and authors' calculations.

fall in living standards, we include this threshold primarily as a reference point. As previously noted, we see individuals with a consumption-replacement rate under 75 percent as at risk of a significant decline in their standard of living after retirement. Individuals with a replacement rate of less than 50 percent would seem likely to experience a very substantial drop in their standard of living.

For recent retirees, the proportion of individuals with replacement rates under 100 percent is roughly 44 percent. The proportion with less than 75 percent consumption replacement is much smaller, however, at about 16 percent, and very few recent retirees, fewer than 3 percent, have replacement rates under 50 percent.

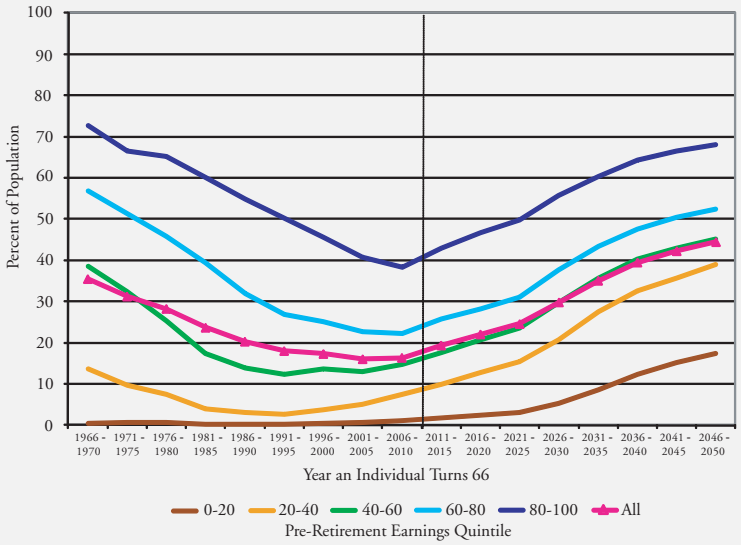
The trends in these measures are similar, differing mainly in degree, and they correspond to the opposite trends seen in average total replacement rates in Figure 6. Over most of the historical period, as average replacement rates for retiring cohorts were increasing, the proportion of these cohorts with replacement rates under these thresholds fell. For recent retirees, this trend has started to reverse. The proportion of individuals not meeting a given replacement threshold increases markedly across future retirement cohorts (Figure 8) and at a greater rate than the decline in average total replacement rates.

The proportion of individuals who appear likely to experience less than 75 percent consumption replacement in retirement is shown broken out by pre-retirement-earnings quintile in Figure 9. The proportion of individuals below this threshold increases substantially as pre-retirement earnings increase.

This finding is not surprising because the public pension system, which is mandatory and has nearly universal coverage, provides high levels of consumption replacement to individuals with low pre-retirement earnings. The higher a person's earnings, the more voluntary saving by the individual (and/or his or her employer) through RPPs, RRSPs, home equity, or other instruments is needed to replace consumption in retirement.

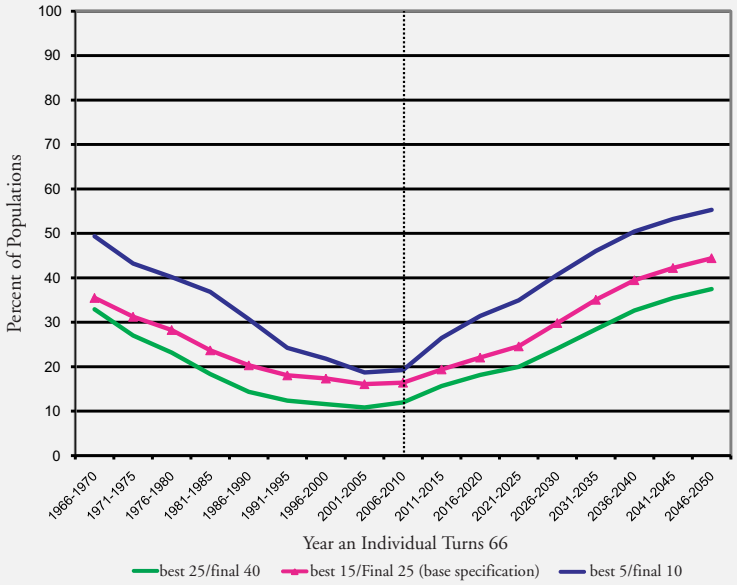
The projected trend of large increases in the proportion of future retirement cohorts with low replacement rates holds across the entire pre-retirement earnings spectrum. Over time, the pre-retirement consumption of all cohorts is projected to rise in real terms, supported by rising household earnings - although they are projected to increase at a slower pace than in the past 40 years. These higher living standards during working life will be, on average, more difficult to

Figure 9: Proportion of Population with Total Replacement Rate <75% by Pre-Retirement Earnings Quintile and Retirement Cohort, 1966-2050



Sources: Statistics Canada LifePaths Model and authors' calculations.

Figure 10: Proportion of Population with Total Replacement Rate <75% by Pre-Retirement Earnings Quintile and Retirement Cohort, 1966-2050



Sources: Statistics Canada LifePaths Model and authors' calculations.

replace in retirement. While almost no one in the bottom quintile of the most recent retirement cohort has replacement rates below 75 percent, it is projected that almost 20 percent of the bottom quintile of the 2050 retirement cohort will.

Sensitivities

How sensitive are these findings to some of the methodological choices made and to some of the more significant assumptions made about future socioeconomic parameters? Clearly, very large differences in methods and assumptions could

produce quite different results. The principal finding of this analysis – that is, the projection of substantial increases in the proportion of future retirees with low levels of consumption replacement – persists, even with alternative methodologies and assumptions.

Pre-retirement Standard of Living

A critical methodological issue in designing a replacement-rate measure is the choice of a period to benchmark pre-retirement living standards. Annual pre-retirement consumption tends to be considerably more stable than annual earnings, but it still varies significantly over the life course. Should the retirement-income system be evaluated by whether it replaces an individual's peak life-course consumption? This is the standard implied by many defined-benefit RPPs, which provide pensions based on final average earnings. An alternative is to calculate a broader, "career-average" standard for pre-retirement consumption. The approach taken in this study has been to average each individual's best 15 years of consumption between ages 35 and 60. This excludes the early portion of individuals' careers, when their consumption is often much lower than their "prime-working-age" consumption, and it also avoids "cherry picking" a small number of an individual's years of highest consumption.

Figure 10 tests the sensitivity of the results to the choice of measurement period for pre-retirement consumption, comparing a narrower "peak- career" measure (best 5 out of the final 10 years before retirement) and a broader career-average measure (best 25 out of the final 40 years before retirement) to the base specification.

Not surprisingly, the incidence of replacement rates below 75 percent is very sensitive to the measurement period used for pre-retirement consumption, particularly for cohorts that experienced, or are projected to experience, substantial growth in average real wages over the course of their careers. By contrast, the trends in historical and projected replacement rates are not particularly sensitive to this methodological choice. The projected future trend of substantial increases in the prevalence of replacement rates below 75 percent is not sensitive to different measurement periods for pre-retirement consumption.

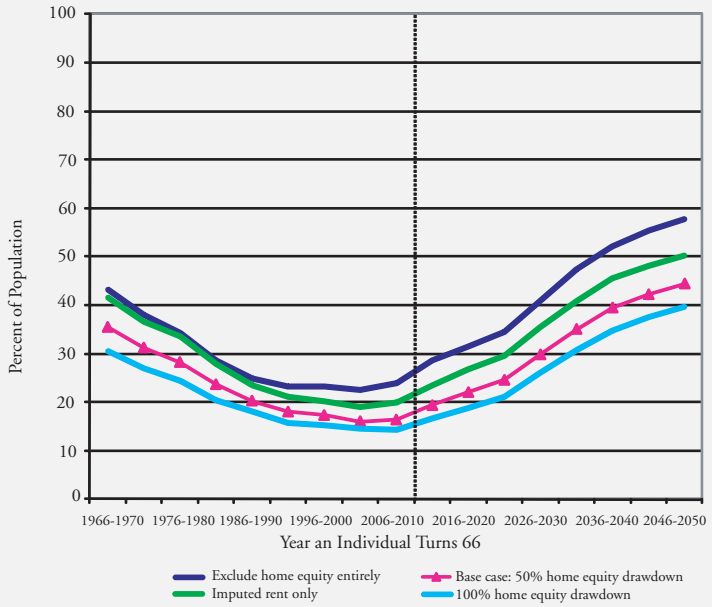
Home Equity and Other Non-Registered Wealth

Another critical issue is the treatment of home equity. In general, there is little controversy over a methodology that expects a retired individual to draw down his or her assets over the course of retirement, transforming them into streams of consumption. There seems also to be little disagreement that the flow of housing services that homeowners receive from their homes (imputed rent) should be included in measures of their consumption. However, many argue that homes are special, and that it is not appropriate to assume that retirees will sell their homes or otherwise deplete their home equity.

Our consumption-replacement measure reflects a compromise. We include imputed rent in both pre-retirement and potential retirement consumption, and we include the amortization of 50 percent of an individual's home equity in the measurement of potential retirement consumption. Figure 11 illustrates the sensitivity of replacement rates to the treatment of home equity. Clearly, different treatments of home equity change the overall levels of consumption replacement. The trends, both historical and future, however, remain intact. (For a discussion of other assets and liabilities that might affect the calculations, see Box 2.)

For a minority of individuals, inheritances are a significant source of consumption. Since our focus is on consumption financed by current and past individual earnings, we would prefer to remove inheritances from consideration. However, the existing data do not generally allow us to distinguish between assets funded by saving as opposed to inheritances. LifePaths' estimates of assets, particularly housing equity, will partially reflect the receipt of inheritances, which may bias our replacement rates upwards.

Figure 11: Proportion of Population with Total Replacement Rate < 75% by Treatment of Housing Equity and Retirement Cohort



Sources: Statistics Canada LifePaths Model and authors' calculations.

Real-Wage Growth and Inflation

We explore the sensitivity of the results to assumptions for the future growth of real wages in Figure 12. The base assumption is that, after a transition period, real wages increase by 1.3 percent a year. This is the base assumption of the Chief Actuary of Canada in his latest report on the CPP (Canada 2010).

We test the importance of this assumption by running alternatives with markedly different real-wage growth rates: 0.5 percent and 1.9 percent. Since we are comparing individuals' consumption possibilities in retirement to their actual consumption during their working years, consumption-replacement outcomes are only modestly sensitive to assumptions for real-wage growth, especially in the longer term. The trend of a substantially increasing incidence of replacement rates under 75 percent persists regardless of the assumptions about future changes in real wages.

Because inflation has broadly similar impacts on wages, rates of return, and public pensions, variations in the assumptions for inflation make very little difference to the results. We experimented with inflation rates of 0 percent and 4 percent annually; the impacts were too small to show graphically.

Rates of Return on Saving

We show the sensitivity of future consumption replacement in retirement to assumptions about future rates of return in Figure 13.

The base assumption is that, in aggregate, the future real market rate of return for the various asset classes held by RRSPs and defined-contribution RPPs will be roughly 4 percent. This has been the historical average over the past 72 years. After accounting for investment costs, and the individual-level performance penalties implied by the aggregate data on RRSP wealth in the 1999 and 2005 Survey of Financial Security, the base assumption is that the net real rate of return received by individuals in the future will be roughly, in aggregate, 1 percent for RRSPs and 2.5 percent for defined-contribution

Box 2. Other Assets and Liabilities Potentially Affecting Consumption Replacement in Retirement

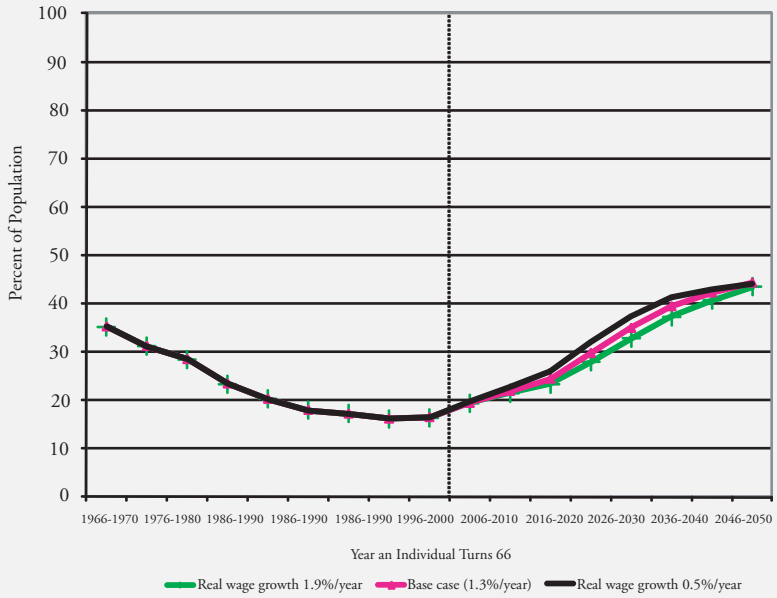
LifePaths does not currently model some components of savings and net worth that would ideally be incorporated into consumption-replacement rates. Elements that are missing include savings and financial assets other than RPPs and RRSPs; non-mortgage debt; and real assets other than owner-occupied homes, such as business equity and recreational real estate.

These missing components will be added to LifePaths as resources permit. In the meantime, their absence is not considered particularly consequential. Like the addition of home equity to the analysis in Figure 11, their inclusion will reduce the proportion of individuals in all retirement cohorts with low replacement rates. However, it should do so to a much lesser extent than housing equity, because many individuals have significant home equity at retirement, whereas far fewer have substantial assets in these other, omitted sources. Furthermore, initial exploration suggests that projected replacement rates from these sources will decline across future retirement cohorts; their eventual inclusion in the analysis is expected to reinforce, rather than challenge, the findings presented here, namely, the projection that the incidence of low consumption-replacement rates for future retirees will increase substantially.

It should be noted that LifePaths does not currently model Tax Free Savings Accounts (TFSAs), a new tax-preferred savings vehicle that has recently been introduced in Canada. At this point, there are not enough data to support the modelling of TFSAs or to make informed judgments about their likely long-term impact on future consumption replacement in retirement. TFSAs have the potential to improve the replacement rates of future retirement cohorts, especially if they motivate significant new saving, rather than merely serving as a substitute for other forms of saving.

Sources: Statistics Canada LifePaths Model and authors' calculations.

Figure 12: Proportion of Population with Total Replacement Rate < 75% by Future Real Wage Growth and Retirement Cohort



Sources: Statistics Canada LifePaths Model and authors' calculations.

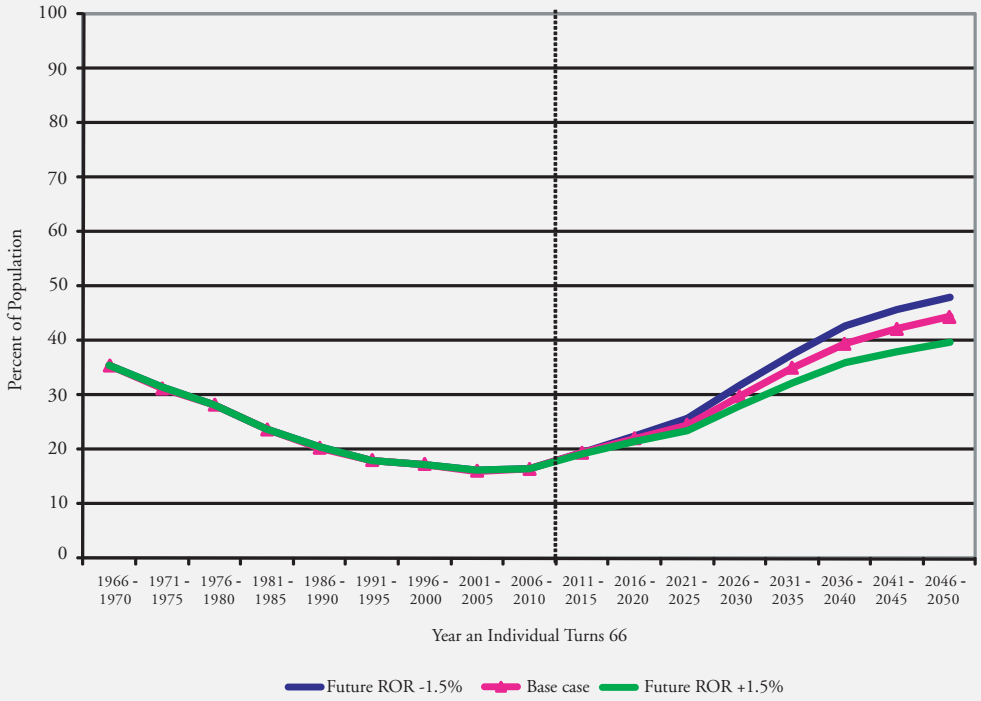
RPPs. Individuals do not all receive these aggregate net rates of return; LifePaths models a number of sources of individual variation in rates of return, including differences in portfolio composition.

Sensitivity analysis was performed by both increasing and decreasing the net rates of return that individuals receive by 150 basis points. Note that this could represent differences in overall market rates of return, costs, astuteness in investing, or combinations thereof.

Not surprisingly, consumption replacement is sensitive to the net returns that individuals receive on their retirement saving, especially in the longer term (see Figure 13).

Alternative assumptions about future net real rates of return have the effect of altering the steepness of the projected increases in the

Figure 13: Proportion of Population with Total Replacements Rate <75% by Future Net Rate of Return in RRSPs/Defined Contribution RPPs and Retirement Cohort



Sources: Statistics Canada LifePaths Model and authors' calculations.

incidence of replacement rates under 75 percent, suggesting that retirement-income reforms that increase the net return individuals receive can brighten Canadians' retirement prospects. Even relatively large increases in future net rates of return, however, such as 150 basis points, do not significantly reduce the likelihood of low replacement rates for future retirees.

Future RPP Coverage

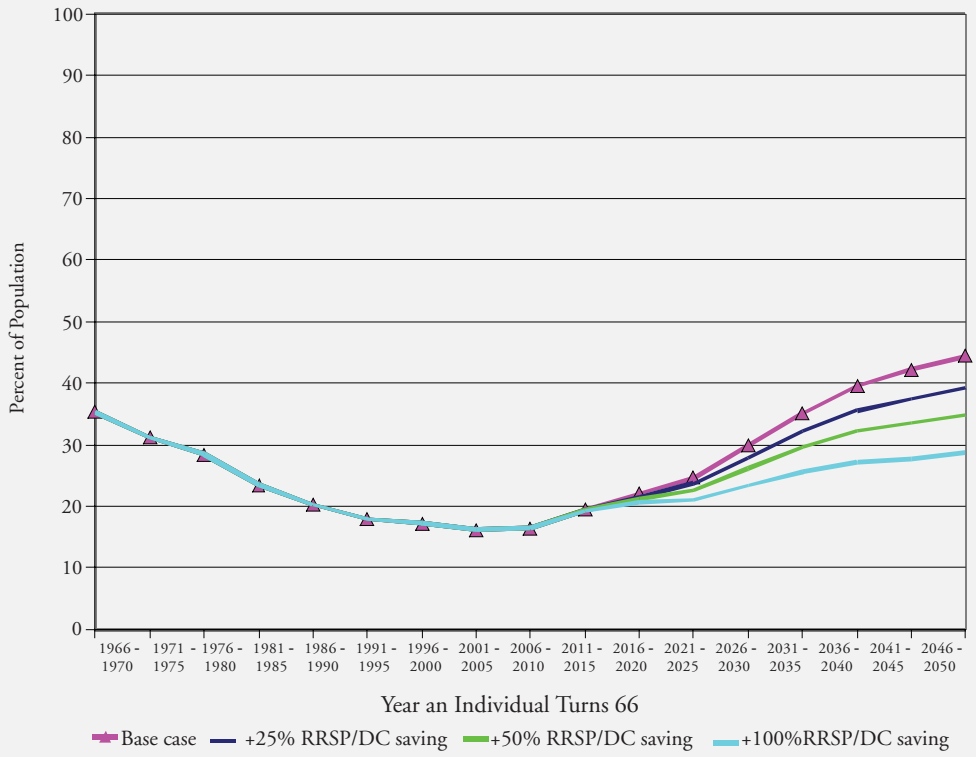
Although the specific results are not presented here, future consumption replacement outcomes were found to be quite insensitive to assumptions regarding future private-sector RPP coverage.

That variations involving more or less future RPP coverage in the private sector produced results similar to those in the base case reflects the relatively low level of RPP coverage in private sector currently, and the fact that there is an integrated limit for RPP saving and RRSP saving. It also reflects the relative inertia of RPP coverage; if, as assumed, decreases in RPP coverage primarily affect new membership in RPPs, rather than existing RPP members, it will take forty years or more to be fully-realized in replacement rates.

Future Retirement Saving

The base projections assume that the future retirement saving of workers will be consistent with the outcomes and trends in retirement saving observed in historical data, especially over the last decade. The persistence of historical behaviour in a population of workers that, as in our projections, looks ahead and sees difficulties maintaining their living standards in retirement is open to question. We therefore tested the sensitivity of our results to some different assumptions about saving. For simplicity, we explored scenarios in which, starting in 2011, all individuals who currently save in RRSPs and

Figure 14: Proportion of Individuals with Total Replacement Rate <75% by RRSP/DC Saving Scenario and Retirement Cohort



Sources: Statistics Canada LifePaths Model and authors' calculations.

contribute to defined-contribution RPPs increase their annual contributions by 25 percent, 50 percent, or 100 percent.

Higher saving affects both the numerator and the denominator of our consumption-replacement measure, since it lowers consumption during working life and raises the income from which to cover consumption in retirement. These impacts combine to produce the results in Figure 14, which shows a modest reduction in the proportion of retirees at risk of seeing a substantial drop in living standards in retirement with the 25 percent increase in these forms of saving, and more substantial impacts with the 50 and 100 percent increases. This last – and admittedly less than realistic - scenario reduces the share of the population that will have less than 75-percent consumption replacement by our measures considerably below the base case, but does not stop it from rising relative to the current situation.

Concluding Remarks

In recent years, factors such as declining private occupational pension-plan coverage, the financial crisis, low household saving rates, lower long-term real rates of return, the aging of the population, and higher life expectancies have raised questions about how well Canada's current and future workers will be able to maintain their living standards in retirement.

To date, it has been very difficult to estimate how current trends might affect Canada's diverse population in the long run. In this study, we used LifePaths – a sophisticated simulation model developed by Statistics Canada which integrates a tremendous amount of data on the socioeconomic experience of Canadians – to project consumption before and after retirement for Canadians who have not yet reached retirement age.

Before discussing our main findings, it is worth reiterating a few elements that distinguish LifePaths from alternative methods of analysis.

Accurately projecting over very long periods of time – some 40 years in this study – is inevitably conditional upon the realization of key assumptions about socioeconomic and demographic trends. LifePaths is no exception, but what makes LifePaths particularly valuable – and useful in testing the importance of those assumptions – is its ability to model time-varying demographic and socioeconomic patterns on diversified and representative samples of population cohorts over time.

LifePaths also allows the modelling of family consumption on an individual basis, reflecting the diversity and variability of income, saving, employment, and family situations over a lifetime. While it does not encompass all non-registered forms of saving, LifePaths does permit the integration of housing equity, a key form of wealth for the majority of Canadians, into the analysis.

Like Mintz (2009), Baldwin (2009), and LaRochelle-Côté, Myles, and Picot (2008), we find that Canada's retirement system has supported post-retirement consumption relatively well, especially for individuals reaching retirement age in the last 20 years. Since the 1980s, more than half of retirees may even have seen their standards of living go up in retirement – that is, their consumption-replacement rate is higher than 100 percent (Figure 8). On average, public pensions, registered forms of saving, and home equity would appear to have allowed recent retirees to maintain their average work-life standards of living once they retire, and very few modest-income retirees have experienced a significant drop.

A look at the future, on the other hand, shows a different trajectory. After four decades of improvement, the proportion of newly retired individuals unable to replace at least three-quarters of their average pre-retirement consumption from the sources we model is projected to nearly triple over the next 40 years (see Figure 9). If current trends persist, by the 2046-50 period, about 45 percent of workers currently aged between 25 and 30 years would not meet our 75-percent threshold – a jump of nearly 30 percentage points from those who reached retirement in the last five years. For many Canadians, while this decline in the proportion of retirees reaching the 75-percent consumption-replacement threshold does not necessarily imply an absolute drop in their post-retirement living standards compared to current retirees – our projections assume generally rising wages and living standards throughout the period – it seems fair to characterise it as a painful downward adjustment.

This decline in potential consumption replacement would be felt across the entire earnings distribution, including the bottom 20 percent, for almost all of whom it has been standard practice to assume full consumption replacement. In our base case, by 2046-50, nearly one in five newly retired seniors in the lowest earnings quintile does not meet a consumption replacement threshold of 75 percent.

At the upper end of the earnings spectrum - the top 20 percent – the proportion of earners who might not achieve our 75-percent benchmark is very high, exceeding 50 percent for those retiring after 2025 and reaching nearly 70 percent for those retiring in 2050.

These findings reflect the fact that, unlike the situation experienced by cohorts retiring over most of the past 40 years, when the sources of support for retirement consumption we model were becoming stronger, total retirement consumption possibilities are projected to grow very modestly, and to lag behind the future growth in household earnings.

These numbers are large enough to justify a conclusion that in order to maintain their standard of living in retirement, many workers may require a better balance between consumption before and after retirement. How they might achieve that, and how policy might support them, is beyond the scope of this study. We do observe, however, that since the prospect of low replacement rates increases with each successive retirement cohort, those currently in their late 20s and early 30s have the greatest needs in this regard. We also note that, since the projection results vary substantially among

generations, earnings groups, and sources of income, no one reform option would likely be able to address every situation efficiently. Care is needed in assessing how the retirement prospects of various groups, including the time at which people cease work, are likely to change in response to various policy-reform scenarios.

In short, our results point to an often claimed – but up to now largely unsubstantiated – problem. The level of retirement preparedness of a large number of working Canadians, particularly in the younger generations, exposes them to a significant risk of lower living standards in retirement. Policymakers and private pension providers alike should direct their attention to reforms that can mitigate this risk.

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