

Vision

In-depth analysis of a major pension or benefits issue of long-term significance

Volume 19 | Number 3 | November 2016



Decumulation and investment risk

By Fred Vettese, Chief Actuary

In our October *Vision*, we showed how deferring the start of C/QPP pension until age 70 can increase one's retirement income while reducing both investment risk and longevity risk. In essence, the government is absorbing some of the retiree's risk by giving actuarially increased pensions. Those risks do not go away, however.

In a low-yield environment, investment risk is inevitable because exposure to equities is about the only way to achieve a decent return. In this *Vision*, we will be using a Monte Carlo simulation to map out the nature of the risk which DC plan participants face after retirement. We will identify a "worst-case" investment scenario and show that risk can be better managed. Somewhat dramatically, we show how a retired couple can turn financial disaster into a positive outcome with the same investment results.

This *Vision*, the second in our series on decumulation, should be of interest to both the sponsors and participants of DC pension plans. DC plan sponsors can do much more than they have done traditionally to improve the decumulation experience of retiring employees.

Investment risk is not just a theoretical possibility. It showed its teeth most recently in 2008 and indeed, there will always be years when equities produce a net loss rather than a gain. If we look back at historical returns, every decade since the 1930s has included at least two years when returns on the major stock market indices have been negative.

In the last *Vision*, we identified a decumulation strategy that indirectly reduces investment risk. It involves deferring the start of C/QPP to age 70 and instead drawing down one's personal retirement assets first. As a welcome side-benefit, the same strategy also reduces longevity risk. It works because the government ends up paying a higher amount of guaranteed income (for life) when pension commencement is postponed. We showed that this deferral strategy is effective when the investment return is constant and will show later on that it is even more effective when investment results are poor.

In spite of its clear advantages, many retirees will hesitate to follow this strategy (see sidebar). We can only hope that greater familiarity with the concept will eventually dispel the objections. We now turn our attention to tackling investment risk in a more direct fashion.

The global financial crisis of 2008-2009 is still fresh in the minds of many investors. A *Toronto Star* survey that was taken shortly after the crisis revealed that six people out of ten felt they could save for retirement without having to invest in equities. We would respectfully disagree. The risk-free yield at present – on Government of Canada Treasury Bills – is only 50 basis points (½ of 1 percent). Even longer-term illiquid bank GICs are paying less than 2 percent. An aging population is increasing the proportion of savers versus borrowers and thus dimming the prospect of higher interest rates for many years to come. The new mantra in investment circles is “low for long”.

Resistance to starting government pensions late

By deferring C/QPP until age 70, the amount payable is higher by as much as 50 percent (the exact percentage depends on wage inflation). Getting a bigger C/QPP pension reduces both the investment risk and longevity risk that all participants in capital accumulation plans face. In spite of this, fewer than 1 percent of retirees start their C/QPP pension at age 70. Some may not be aware this option is available or may not know how much more pension they can get but the main reason there are so few takers has to do with the “bird in the hand” argument.

The fear of dying young and not having extracted as much C/QPP pension as possible appears to override the fear of outliving one's savings. This is in spite of the fact that the former scenario will never actually induce regret because the retiree will no longer be alive to feel it! Moreover, people tend to overestimate the probability of dying young. The average woman age 65 has only one chance in 40 of dying before 70 and just one chance in 8 of dying before 80. As actuaries, we will continue to maintain that the pension ramifications of living too long should be a bigger concern than dying too young.

As a result, even retirees will have to invest in equities to obtain a reasonable return on their retirement savings. Let us therefore assume in the following illustrations that our retired couple, Carl and Hanna, invests their savings as shown in Table 1.

Table 1 – Asset mix after retirement

| | |
|--|-----|
| FSE TMX Canada Universe Bond index | 50% |
| S&P/TSX Canada Stocks Composite Capped | 25% |
| MSCI World Stocks (CAD) | 25% |

Helping Carl and Hanna

Carl and Hanna, both age 65, are about to retire. Their combined earnings in their final ten years of work averaged \$120,000 a year which puts them in the “comfortable” category though not quite in the top echelon of Canadians. Over the years, they amassed \$500,000 of savings in DC pension plans which they are now transferring into a Life Income Fund (LIF).

Half a million sounds like a lot – and it is – but is it enough to last for the rest of their lives? On their own, Carl and Hanna have no way of knowing the answer. It depends on the answers to the following questions:

1. What is their retirement income target and how will it change in future years?
2. How long will they live?
3. How they should invest their monies?
4. How important are investment fees?
5. What sort of investment return can they expect?

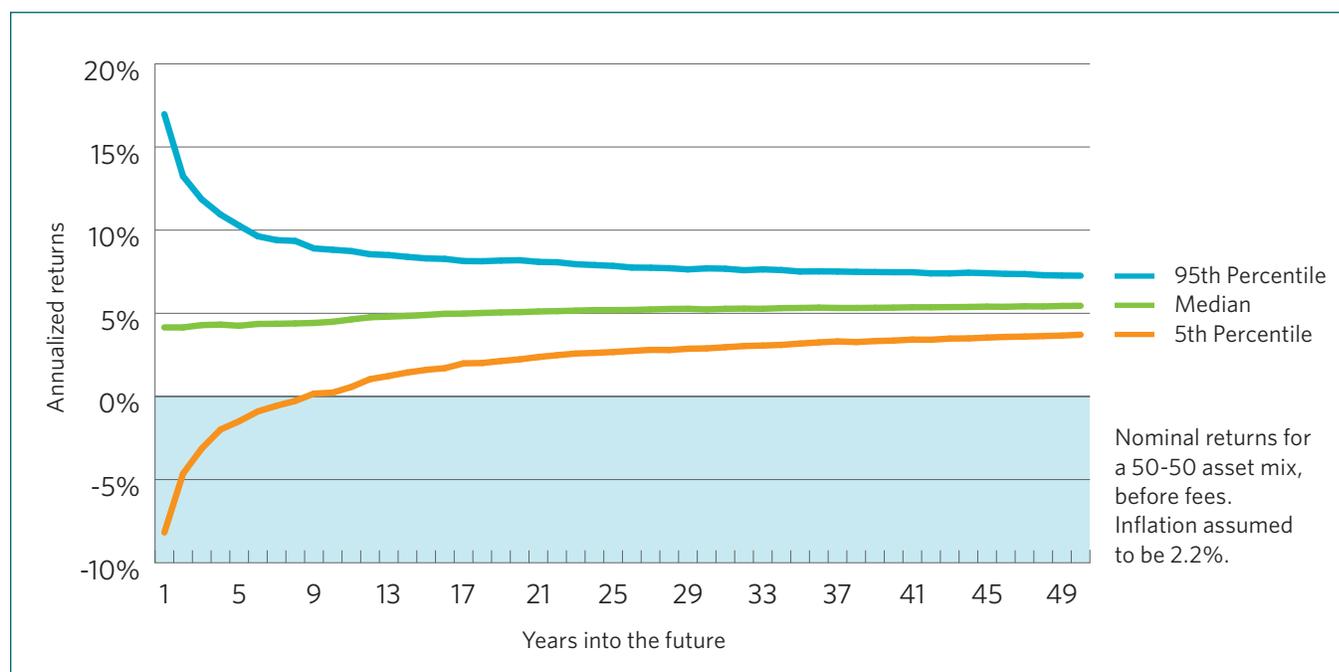
Let us assume that Carl lives until age 88 and Hanna until 95. Both of these lifespans are a little longer than average. We cannot know the investment return they will earn with the 50-50 asset mix they chose but even being able to bracket the range of possible

returns is useful information. This range can be revealed using a Monte Carlo simulation process (see Appendix 1 for a description). By charting all the possible outcomes, we can identify the extreme scenarios and take some comfort that one’s actual experience will almost certainly land somewhere in the middle.

As is shown in Figure 1, plotting the extreme outcomes produces a pattern that resembles a funnel, something we will call the “funnel of uncertainty”. The longer one’s time horizon, the more the worst-case and the best-case scenarios converge.

Unfortunately, they do not converge fast enough. In this case, the average (time-weighted) annualized return over 25 years is 7.85 percent before fees at the 95th percentile versus just 2.67 percent at the 5th percentile. (We will call the latter the **5th-percentile scenario**.)

Figure 1 – The funnel of uncertainty



A difference in returns of more than 5 percent per annum, compounded over 25 years, produces a huge difference in results. Nevertheless, Carl and Hanna now have one piece of information they did not have before; the return they will achieve is no longer a total mystery, especially if viewed with a longer-term horizon.

[As is customary with charts that try to bracket all the possibilities, we have dropped off the top 5 percent and bottom 5 percent of possibilities but as we learned in the Great Recession of 2008, one has to be mindful of the “tails” of a distribution as well.]

Income in the worst-case scenario

Once they move their \$500,000 in savings into LIFs, Carl and Hanna need to invest it and figure out the best way to draw an income. They may end up consulting with friends or family. It is likely that they will ultimately act on the belief that:

- a) Their retirement income target is 70 percent of their average earnings in their final years of work,
- b) That target climbs with price inflation for the rest of their lives,
- c) They should start receiving OAS and C/QPP immediately,
- d) Annuities are best avoided, and

- e) An annual investment fee on their LIF assets of 1.75 percent (175 basis points) is acceptable.

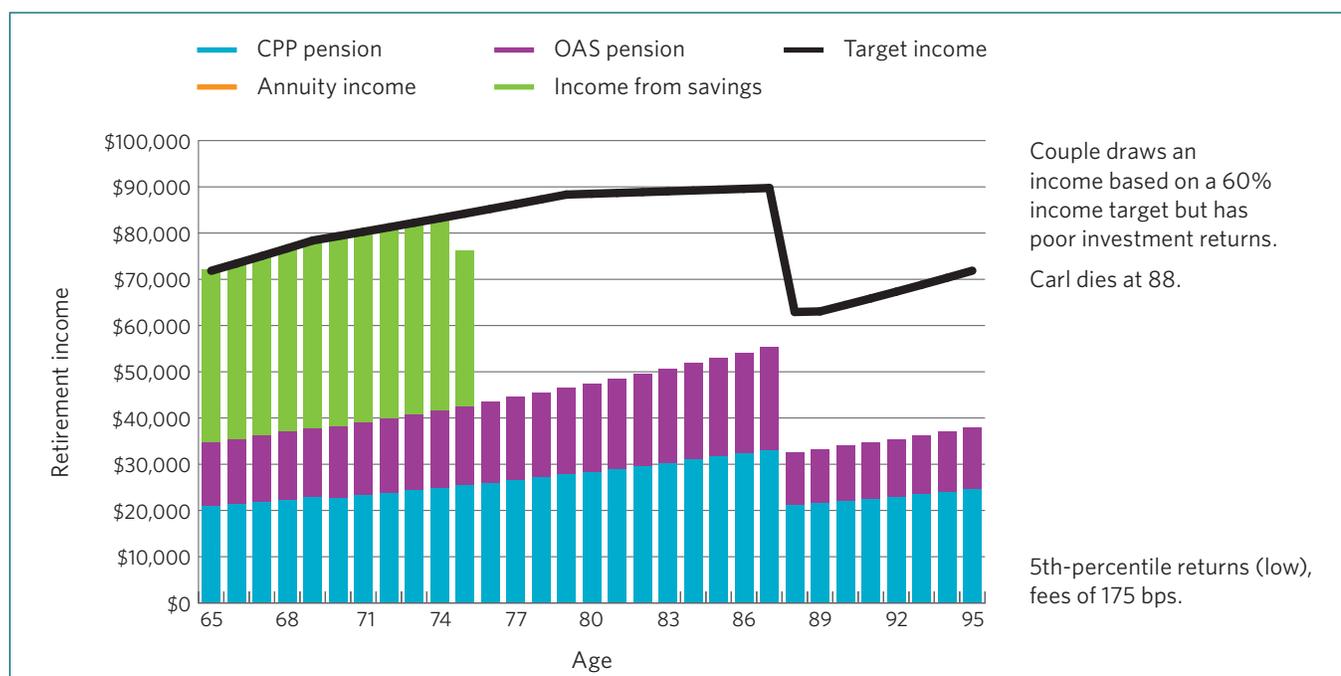
What happens if they follow this strategy but suffer poor investment results year after year, such as investment returns that track the 5th-percentile scenario? This is the type of situation that almost everyone fears, even if they have never heard of a Monte Carlo simulation. It is why most people are cautious about spending their retirement savings too quickly. In this case, let us assume that Carl and Hanna also decide to exercise a little caution and dial back their 70 percent income target to 60 percent.

Even though they think they did everything right and even though they reduced their spending target, the financial implications for Carl and Hanna under the 5th-percentile scenario prove to be disastrous. Figure 2 compares the couple’s retirement income year by year against their chosen 60 percent retirement income target.

Their sizeable nest-egg disappears by age 75, leaving them practically destitute for the last 15 to 20 years of their lives. Carl and Hanna are both despondent and bewildered. Where did they go wrong?

It doesn’t have to be like this. A better fate is within their grasp without having to save more.

Figure 2 - Conventional strategy under a worst-case investment scenario



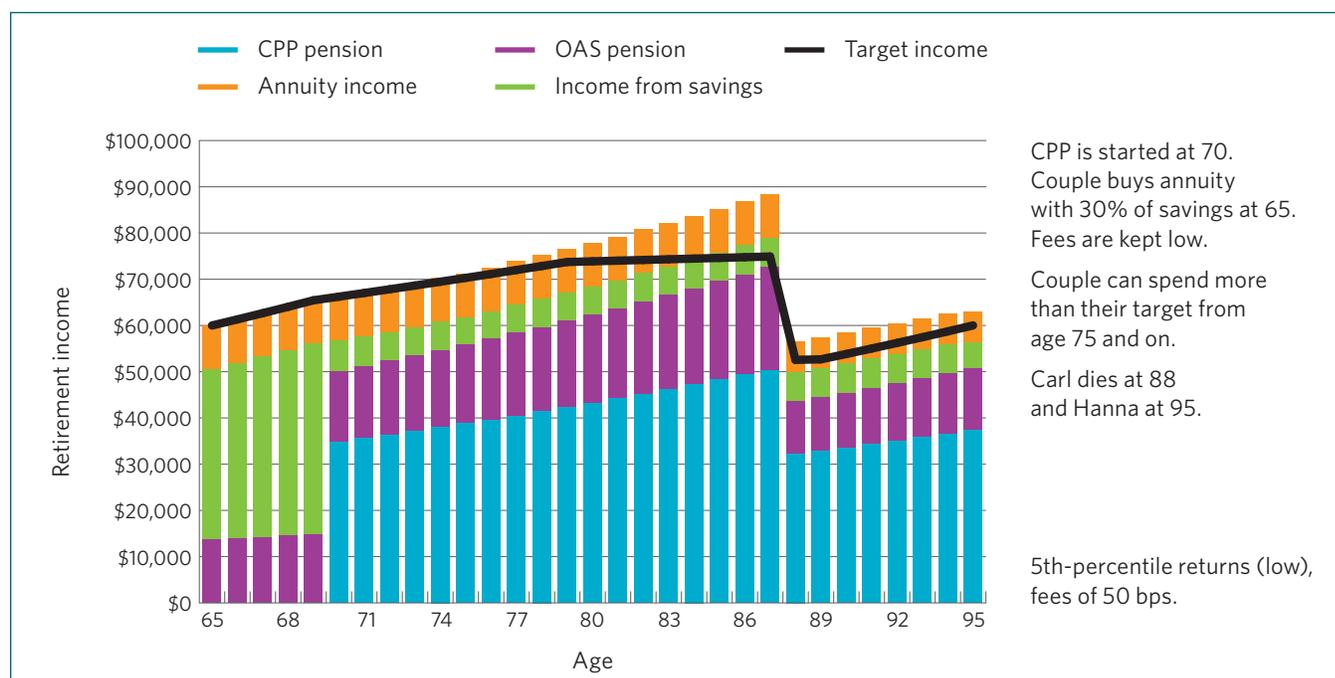
A smarter approach

Carl and Hanna might think their misfortune was the result of inadequate savings combined with bad luck. Given the poor investment results, their unhappy outcome might seem unavoidable. Nothing could be further from the truth. Let us assume that they make the following adjustments to their thinking and their strategy:

- Rather than arbitrarily choose a retirement income target of 60 percent of final average pay, they map out their expenditures in the last ten years of their lives and find their own target is closer to 50 percent. This is derived in Appendix 2.
- It is natural to assume that one's retirement expenditures will always rise with inflation but that is usually not the case. Spending slows with age. A short description of the academic studies to back this finding is set out in Appendix 3. Carl and Hanna follow this revised spending path.
- We learned in the previous *Vision* that one can reduce risk and increase income by deferring C/QPP and OAS. It turns out this strategy is even more effective in the event of very poor investment returns, though we will assume that only C/QPP should commence at 70 and leave OAS commencement at 65¹.
- As a hedge, they allocate 30 percent of their savings at age 65 to the purchase of an annuity. Since they leave the asset mix the same on the remaining 70 percent, they have essentially reduced their equity exposure.
- They decide to pay more attention to investment fees and use low-cost ETFs and in the process they reduce their fees to 50 basis points (from 175 bps).

As Figure 3 shows, the result is quite startling. The \$500,000 in savings, which had appeared to be totally inadequate, turns out to be more than enough, even with persistent 5th percentile investment returns.

Figure 3 - A smarter approach with a worst-case investment scenario



1 There are various reasons for this, including a lesser advantage for deferring OAS versus C/QPP.

From age 70 and on, Carl and Hanna are able to spend more money on themselves in real terms than they ever did while they were still working. Even if Hanna lived until 100, she would have enough money to meet her needs.

The trouble is that retirees like Carl and Hanna are highly unlikely to stumble upon this approach on their own. It takes a great deal of expert knowledge to put all the pieces together. That knowledge is not readily available to the general public but plan sponsors have ready access to the necessary service-providers and could extend this access to retiring plan participants.

For instance, investing in ETFs takes more sophistication than most new retirees have. Ideally, retirees who participated in DC pension plans would be allowed to keep their assets in their DC plan (where fees are usually much lower) and draw an income from the fund.

To do this, however, participants must overcome two hurdles. First, the regulations must permit variable income payments to be made to retirees from a DC pension plan. Not all jurisdictions allow this. Ontario is the most notable holdout² which is unfortunate when 3,000 Ontarians are reaching their 65th birthday every week. We can only hope that Ontario will give this important issue a higher priority than it has to date. Second, the participants must hope that their employers feel inclined to provide support; even in jurisdictions that permit income payments from DC pension plans, the employer is not required to offer this option.

Conclusion

It should now be apparent that DC participants who are at the point of retirement should not be left to fend for themselves. An intelligent decumulation process is more complex than it appears while the consequences of a bad implementation can be devastating. Unfortunately, the interests of commission-based advisors do not always align with those of retirees, which means the employer as plan sponsor should consider taking a more active role.

There are many facets of decumulation still to be explored:

- Was it a fluke that the \$500,000 in savings in the example turned out to be about the right amount? How can retirees (or DC plan sponsors on their behalf) assess the adequacy of their own savings? And how can mid-career employees make that determination so they can take corrective measures with regard to savings rates while there is still time?
- What about the assets that remain after death? Different vehicles have different survivor benefits. Some retirees will want to take this into account when assessing the merits of tactics like partial annuitizing or late commencement of C/QPP, especially if death occurs earlier.
- What is the right asset mix for retirees? In a low-yield world, is 50 percent in equities too low? Is it too high? How should it change when an annuity is purchased with part of the assets?
- What are the regulatory hurdles to pursuing an intelligent decumulation strategy and what about the employer's fiduciary liability in providing support?

These and other questions will be addressed in future instalments of this series on decumulation.

² The other exceptions include New Brunswick and Newfoundland. Quebec just passed regulations to allow retirement income to be paid from DC plans.

Real-life scenario

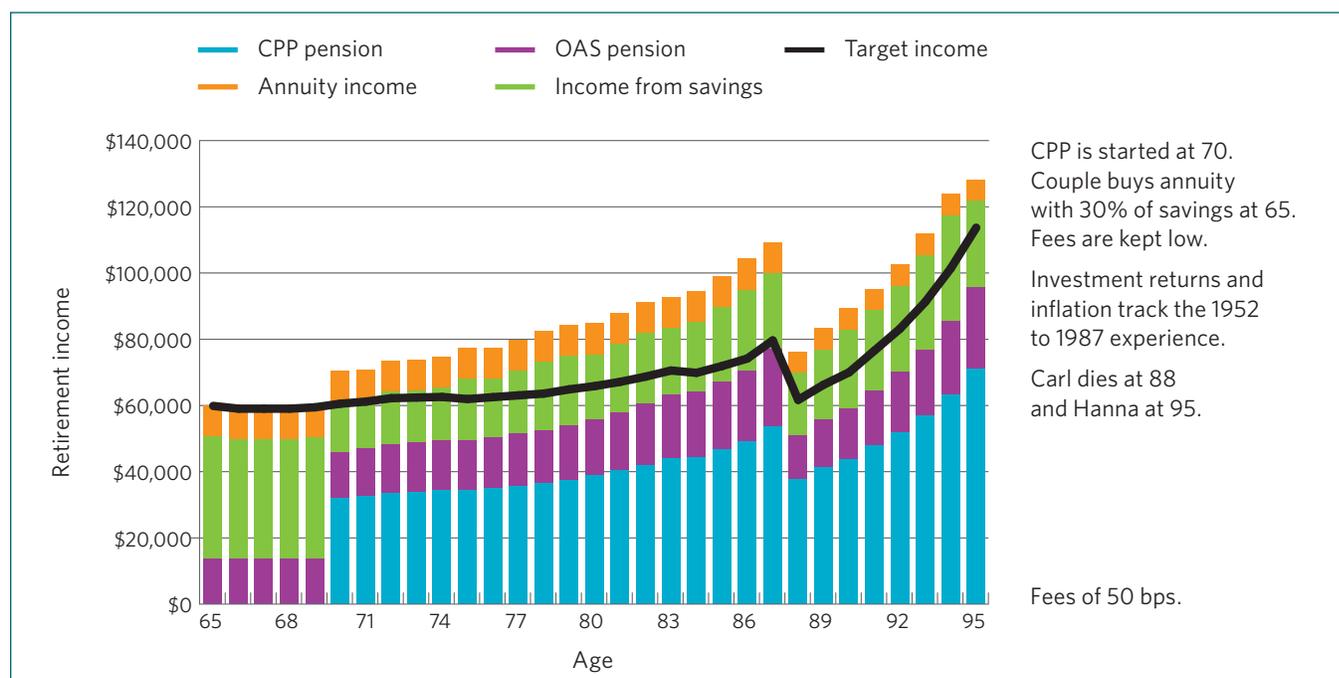
We will end this issue of *Vision* on a positive note. Monte Carlo simulations are by definition an artificial depiction of the real world. One might wonder what would have happened under a real life scenario. Was there another period in which inflation and bond yields were low for a prolonged period of time? Looking back in history, the period which (at the beginning anyway) most resembles the current capital markets covered the years 1952 to 1987. Inflation started off near 0 percent and Canada even flirted with deflation in 1952. Long-term bond yields started the period at 3.56 percent. Low inflation and bond yields prevailed for the subsequent 10 to 15 years but there was much turmoil after that. The 35-year period included the oil price shocks of the 1970s, steeply rising inflation, a 17-year period in which the cumulative return on long-term bonds

was negative 46 percent and one of the worst bear markets ever for stocks (the loss in 1974 was greater in real terms than in 2008).

In spite of all that, if Carl and Hanna face a similar period over the next 35 years, they would actually make out quite well with their \$500,000 in savings. As shown in Figure 4, their actual income would have exceeded their target income in most years and would never have fallen short.

This is not to say that investment performance over the next 35 years will track the 1952-87 period. For one thing, an aging population probably means that interest rates and returns will remain low for a long time to come. On the other hand, present-day retirees might avoid the rampant inflation that plagued retirees in the 1970s and 1980s.

Figure 4 - Historical investment scenario combined with the smarter drawdown approach



Appendix 1 - Monte Carlo simulations

A Monte Carlo simulation is useful in assessing risk. It involves setting the expected long-term return for each asset class as well as the standard deviation and then using a random number generator to simulate how each asset class will perform during the projection period. (Some correlation between asset classes is also assumed.)

Each simulation is called a “trial”.

By running enough trials, about 2,000 of them, a pattern emerges. That pattern reveals the probability of investment returns at each level. For this *Vision*, we have used the process to determine a “worst-case” scenario as well as a “best-case” scenario. In fact, worse scenarios are possible but highly improbable. The same holds true for good scenarios. We have identified the 5th-percentile scenario as the worst-case scenario, meaning there is still a 5 percent chance of a worse result; this is probably small enough chance to allay the concerns of most retirees.

To create the Monte Carlo simulations, assumptions had to be made about the expected long-term return and the standard deviation of each asset class.

In arriving at the long-term return on bonds, it was assumed that the yield on Universe bonds would climb from about 2 percent currently to 3.74 percent in a linear fashion over the next ten years, after which they would remain at the 3.74 percent level.

| Asset Class | Asset Allocation | Long-Term Return | Standard Deviation |
|--------------------------------------|------------------|------------------|--------------------|
| FSE TMX Canada Universe Bonds | 50% | 3.23% | 1.06% |
| S&P/TSX Can. Stocks Composite Capped | 25% | 7.50% | 16.50% |
| MSCI World Stocks \$CA | 25% | 6.90% | 15.40% |

Appendix 2 – Setting one’s retirement income target

What is the best way to determine your retirement income target? If you have had several promotions in your career, you are going to want to live better than you did 25 years ago. The same goes if you conscientiously saved and sacrificed for years in order to get ahead. Consider Carl and Hanna’s financial situation in their last 10 years before retirement as summarized in the table below:

| Age at start of year | Gross pay (combined) | Less mortgage payments | Less child-related expenses | Less work-related expenses | Less CPP and EI deductions | Less retirement saving | Less income tax | Net pay available for spending | Net pay as a % of gross pay |
|----------------------|----------------------|------------------------|-----------------------------|----------------------------|----------------------------|------------------------|-----------------|--------------------------------|-----------------------------|
| 64 | \$133,700 | \$— | \$1,200 | \$2,700 | \$6,200 | \$33,400 | \$14,700 | \$75,500 | 56% |
| 63 | \$131,100 | \$— | \$4,000 | \$2,600 | \$6,000 | \$32,800 | \$14,400 | \$71,300 | 54% |
| 62 | \$128,500 | \$— | \$4,000 | \$2,600 | \$5,900 | \$28,300 | \$15,400 | \$72,300 | 56% |
| 61 | \$126,000 | \$— | \$8,000 | \$2,500 | \$5,800 | \$25,200 | \$15,100 | \$69,400 | 55% |
| 60 | \$123,500 | \$18,000 | \$8,000 | \$2,500 | \$5,700 | \$24,700 | \$14,800 | \$49,800 | 40% |
| 59 | \$119,300 | \$18,000 | \$8,000 | \$2,400 | \$5,600 | \$15,000 | \$20,300 | \$50,000 | 42% |
| 58 | \$115,300 | \$18,000 | \$15,000 | \$2,300 | \$5,500 | \$5,800 | \$23,100 | \$45,600 | 40% |
| 57 | \$111,400 | \$18,000 | \$15,000 | \$2,200 | \$5,400 | \$5,600 | \$22,300 | \$42,900 | 39% |
| 56 | \$107,500 | \$18,000 | \$20,000 | \$2,200 | \$5,300 | \$5,400 | \$21,500 | \$35,100 | 33% |
| 55 | \$103,700 | \$18,000 | \$20,000 | \$2,100 | \$5,200 | \$5,200 | \$20,700 | \$32,500 | 31% |
| Average | \$120,000 | \$10,800 | \$10,320 | \$2,410 | \$5,660 | \$18,140 | \$18,230 | \$54,400 | 45% |

The average annual amount they have available to spend on themselves in the last ten years is \$54,400. The range from year to year, however, is quite extreme with a low of \$32,500 and a high of \$75,500. We note that even the \$42,900 they had available to spend at age 57 is probably more than they had ever spent up to that point. Nevertheless, they probably want to spend more than that in retirement. On the other hand, it would be unrealistic to expect to spend \$75,500 a year in retirement since they had no history of spending such a sum and no reason to think they had saved enough

to do so. Lifetime consumption theory asserts that people who experience a sudden increase in income tend not to spend all of it if they are not confident that the higher level of spending is sustainable.

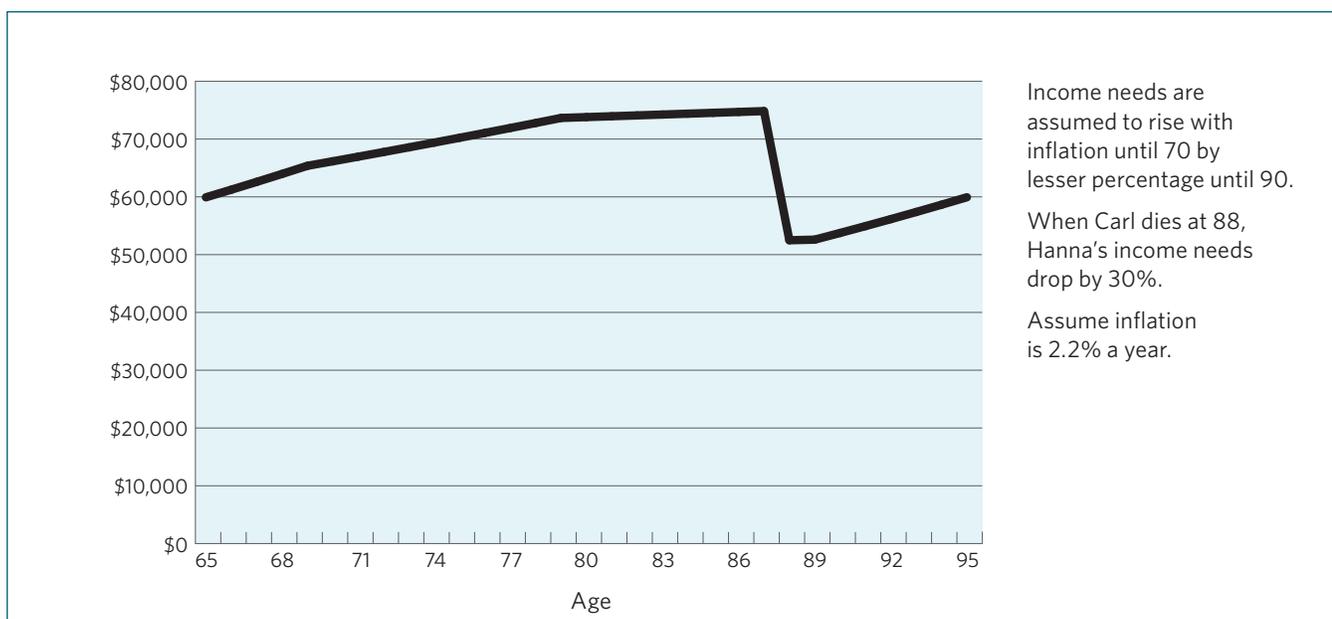
A reasonable, and very Canadian, compromise is to plan for consumption in retirement at a pace that is about equal to the average of their spendable income in the last ten years before retirement. In this case, the average is \$54,400 after tax which translates into about \$60,000 before tax.

Appendix 3 - The retirement income target in future years

Using the results of Appendix 2, we will assume that Carl and Hanna need \$60,000 of pre-tax income in the first year of retirement. In future years, their spending will continue to rise, but not necessarily as quickly as inflation. Extensive data shows that spending eventually slows down and that this slowdown happens across all income levels. This has more to do with an ever-diminishing inclination or ability to spend money than with a lack of money. Older retirees have higher savings rates than people in their 40s! Numerous academic papers from Europe and the United States as well as some (admittedly limited) data from Canada all show that the drop in spending with advancing age is a universal phenomenon:

- A 2012 EBRI³ study by Michael Hurd and Susan Rohwedder concluded that real (inflation-adjusted) spending by college-educated married couples fell by 1.23 percent a year in their late 60s, 1.75 percent a year in their 70s and 2.75 percent a year in their early 80s.
- A Canadian study by McKinsey also shows that spending drops sharply with age – roughly by the same percentages as the Hurd/Rohwedder study – though it should be pointed out that the McKinsey study was not based on longitudinal data and was not corrected for changes in household size.
- A 1992 German study by Borsch-Supan that covered 40,000 households found that retirees would slowly draw down their life savings during their 60s, as expected, but that savings started to climb again in their 70s as spending declined.
- A 2015 UK study (Brancati et al) found that a household headed by an 80-year-old spends 43 percent less on average than a household

Figure 5 – Retirement income target for Carl and Hanna



3 The Employee Benefit Research Institute is a Washington-based think tank.

headed by a 50-year-old and yet feel their spending is not constrained by a lack of money. If one includes mortgage payments in the calculation, then 80-year-olds spend 56 percent less.

- The same study found that household expenditure in retirement fell by 1.4 percent a year, after adjustments for various factors such as household size.
- Back in the United States, a study by David Blanchett of Morningstar found that real spending declined by about 1 percent a year in the first 10 years of retirement, 2 percent a year in the next 10 years and 1 percent a year thereafter.
- A third US study, this one by JP Morgan using its own data, found that real spending among affluent households dropped by 1 percent a year for the first 20 years of retirement.
- As for household size, there is a broad consensus that spending is proportional to the square root of the number of persons in the household. Hence a one-person household would spend about 30 percent less than a two person household (derived by dividing 1 by 1.414, the square root of 2).

The remarkable consistency in these studies allows us to estimate the annual decline in real spending with some confidence. Taking all the foregoing studies into account and injecting a little conservatism, we have assumed here that real spending does not begin to decline until age 70 and then falls by:

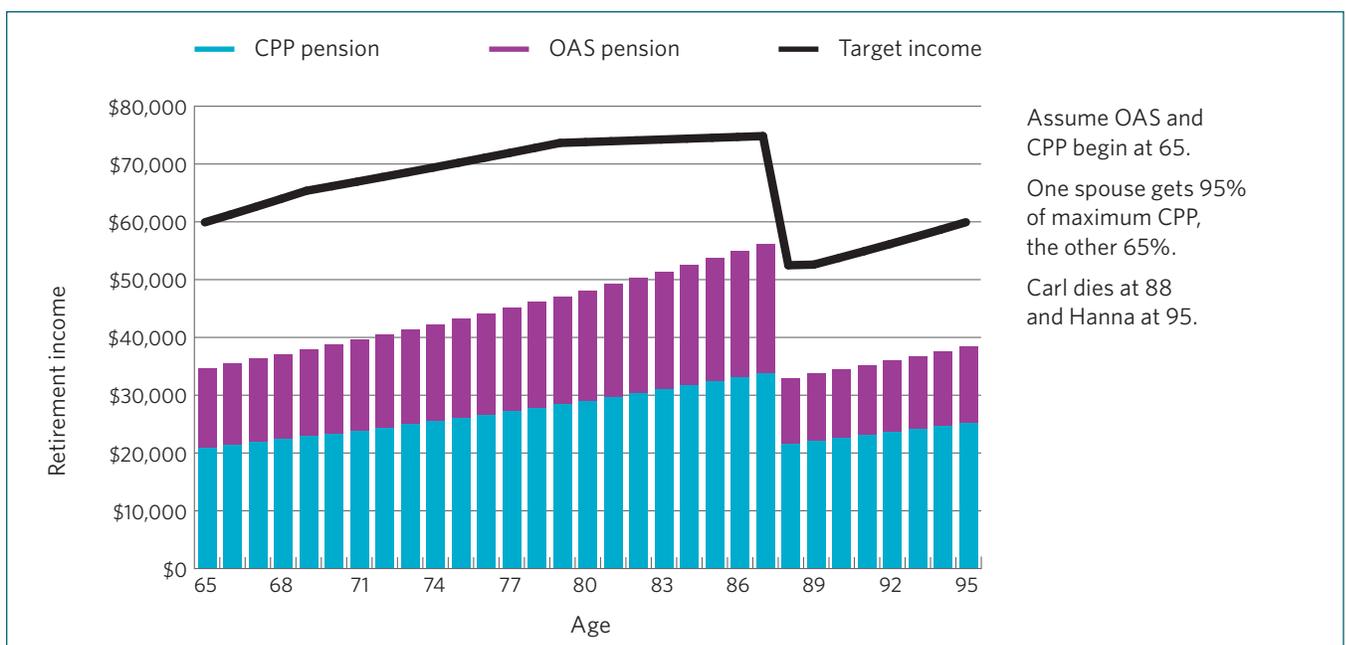
- 1 percent a year throughout one's 70s,
- 2 percent a year in one's 80s⁴,
- 0 percent from age 90 and on, and
- A one-time drop of 30 percent when a spouse dies.

When we factor these percentages into future spending needs, we get the spending curve shown in Figure 5.

Income from Pillars 1 and 2

In Figure 6, we calculate how much of their income needs will be met by pensions from OAS and C/QPP. This is the easy part. As expected, there is a considerable gap between their retirement income needs and what government pensions provide. Because C/QPP and OAS are rising faster than the income target, that gap mercifully narrows during their 70s and 80s but it is still substantial.

Figure 6 – Couple's pension from CPP and OAS



⁴ Note these percentages are slightly different from those used in the last *Vision* and reflect a combination of increased conservatism and the inclusion of data from a wider set of studies.

Contributors:

Emily Tryssenar and **Lisa Bjornsen**

(Morneau Shepell Toronto Retirement Solutions),

Serge Charbonneau and **Charles Bienvenue**

(Morneau Shepell Montreal Retirement Solutions),

and **Malcolm Hamilton**

(Senior Fellow at C.D. Howe)

Morneau Shepell is the only human resources consulting and technology company that takes an integrative approach to employee assistance, health, benefits and retirement needs. The Company is the leading provider of employee and family assistance programs, as well as the largest administrator of retirement and benefits plans and the largest provider of integrated absence management solutions in Canada. Through health and productivity, administrative, and retirement solutions, Morneau Shepell helps clients reduce costs, increase employee productivity and improve their competitive position. Established in 1966, Morneau Shepell serves approximately 20,000 clients, ranging from small businesses to some of the largest corporations and associations in North America. With almost 4,000 employees in offices across North America, Morneau Shepell provides services to organizations across Canada, in the United States, and around the globe. Morneau Shepell is a publicly-traded company on the Toronto Stock Exchange (TSX: MSI)

morneaushepell.com



@Morneau_Shepell



Morneau Shepell

