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Safe Withdrawal Rates for Retirees in Canada Today

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Introduction

Given the heavy reliance by most Canadians on government plans and personal savings to meet their financial needs during retirement, it is important to have a reasonable expectation of the proportion of their assets they can withdraw safely each year. Commonly known as the "safe withdrawal rate," this is the amount that ensures sufficient capital remains to deliver a similar level of future income.

There is a growing body of literature on safe withdrawal rates for retirees. However, most of this research is based on the historical returns of assets used by investors in the United States. For example, research by Blanchett, Finke, and Pfau (2013) using U.S. projected returns suggests safe withdrawal rates are likely to be much lower when based on forward looking returns than historical values.

In this paper, we explore safe withdrawal rates from the perspective of historical returns, both international and domestic, but more importantly we provide some estimate of safe withdrawal rates for Canadian investors based on our current return and risk expectations for Canada.

There are three primary findings from this research. First, that while the historical performance of stock and bond markets in Canada has been relatively similar to the global average, future expected returns in Canada, especially in the near term, are likely to be considerably lower. Second, given these lower returns, safe withdrawal rates are relatively low, and may decrease further when incorporating future improvements in mortality (i.e., people keep living longer in retirement) and the impact of fees. Finally, a balanced portfolio is likely to be the best asset allocation for Canadian retirees.

Overall, we conclude that safe withdrawal rates for Canadians are lower today than what would be implied by the frequently cited "4% Rule." While individual circumstances will vary widely, our findings serve as a useful starting point for retirees and their financial advisers.

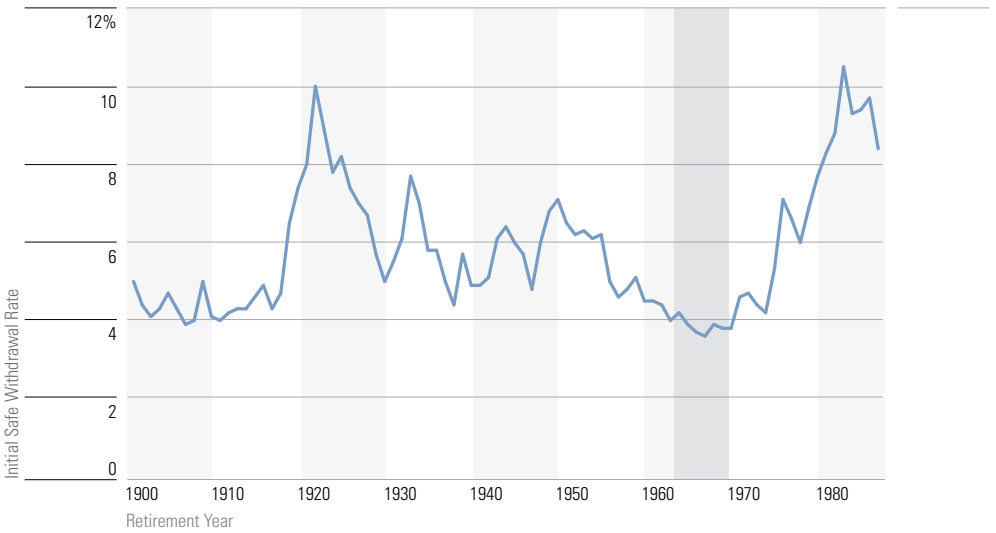
The Shortcomings of the 4% Rule

Research by Bengen (1994), among others, suggests an initial safe withdrawal rate from a portfolio is 4% of the assets, where the initial withdrawal amount would subsequently be increased annually by inflation and assumed to last for 30 years (which is the expected duration of retirement). This finding led to the creation of the "4% Rule," a concept that is often incorrectly applied:

- The "4%" value only applies to the first year of retirement, whereby subsequent withdrawals are assumed to be based on that original amount, increased by inflation.
- Additionally, a retirement period of 30 years may be too short or too long based on the unique attributes of that retiree household.
- The analysis was based entirely on historical U.S. returns.

Exhibit 1 provides some insight as to how the "4% Rule" and other withdrawal rate heuristics have largely been determined. Exhibit 1 shows the highest initial rolling safe withdrawal rate for a U.S. retiree from 1900 to 1986, where retirement is assumed to last 30 years and the retirement income need is increased annually by inflation for the duration of retirement (i.e., is a constant annual inflation-adjusted level of income).

Exhibit 1 Initial Safe Withdrawal Rate %—Where the 4% Rule Comes From



Source: Morningstar. The returns used in this analysis come from the Dimson, Marsh, and Staunton dataset and reflect a portfolio that is 50% US shares and 50% US bonds.

The shaded area shows the worst period for initial withdrawal rates over the historical test period and is effectively where the 4% rule originates as 4% represents the highest initial safe withdrawal rate for U.S. retirees.

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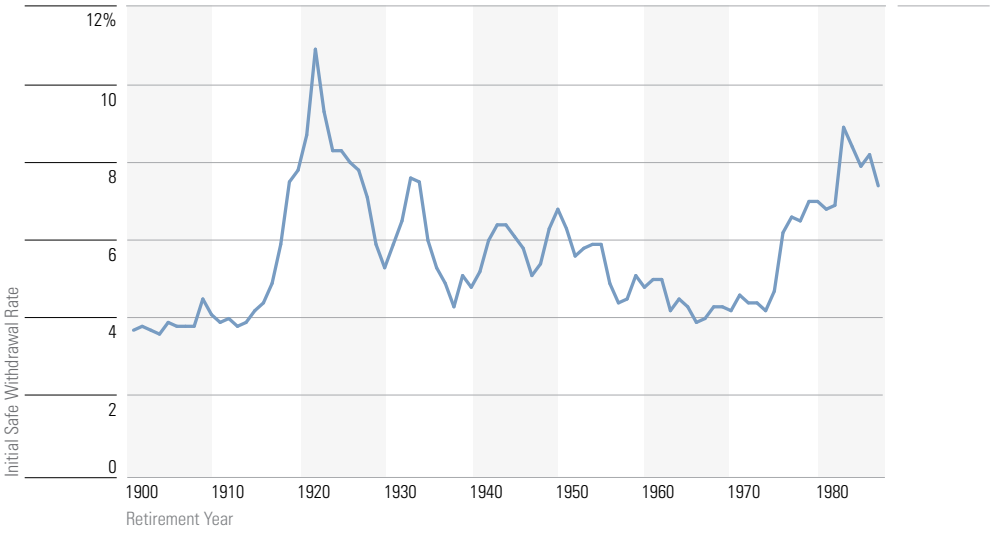
There are several problems extrapolating these results to other countries. First, Bengen did not include fees in his original analysis. There is a definite cost to investing that needs to be considered when estimating withdrawal rates. Second, the analysis assumes retirement lasts 30 years, while in reality, the expected duration of retirement and the respective modelling period will vary by retiree. Third, just because a 4% initial withdrawal has been safe in the U.S., does not mean it would have been safe elsewhere. In Italy, for example, Exhibit 3 demonstrates that it would not. Finally, it is wrong to assume that past returns are a reasonable basis for estimating future retirement incomes. Today's markets returns are generally lower than historical long-term averages. Lower future returns need to be considered when advising retirees on safe initial withdrawal rates.

Historical Returns: An International Perspective

Return assumptions are a significant driver when estimating a safe initial withdrawal rate, probably ranking second in importance behind the length of retirement. In Exhibit 2 we recreate the analysis in Exhibit 1, but instead of using historical U.S. returns we use historical returns for a Canadian investor. We also assume a portfolio fee of 1.00%.

Exhibit 2 The "4% Rule:" A (Historical) Canadian Perspective



Source: Morningstar. The returns used in this analysis come from the Dimson, Marsh, and Staunton dataset and reflect a portfolio that is 50% Canadian shares and 50% Canadian bonds.

There is a striking similarity between the safe initial withdrawal rates in Exhibits 1 and 2. The median correlation of safe initial withdrawal rates from 1900 to 1986 has been 0.71. The correlation between Canadian and U.S. initial safe withdrawal rates has been 0.93. Retirees in Canada have historically had the most similar initial safe withdrawal rates to those in the U.S. among the 19 different countries tested, both in absolute and relative terms. For example, using the same

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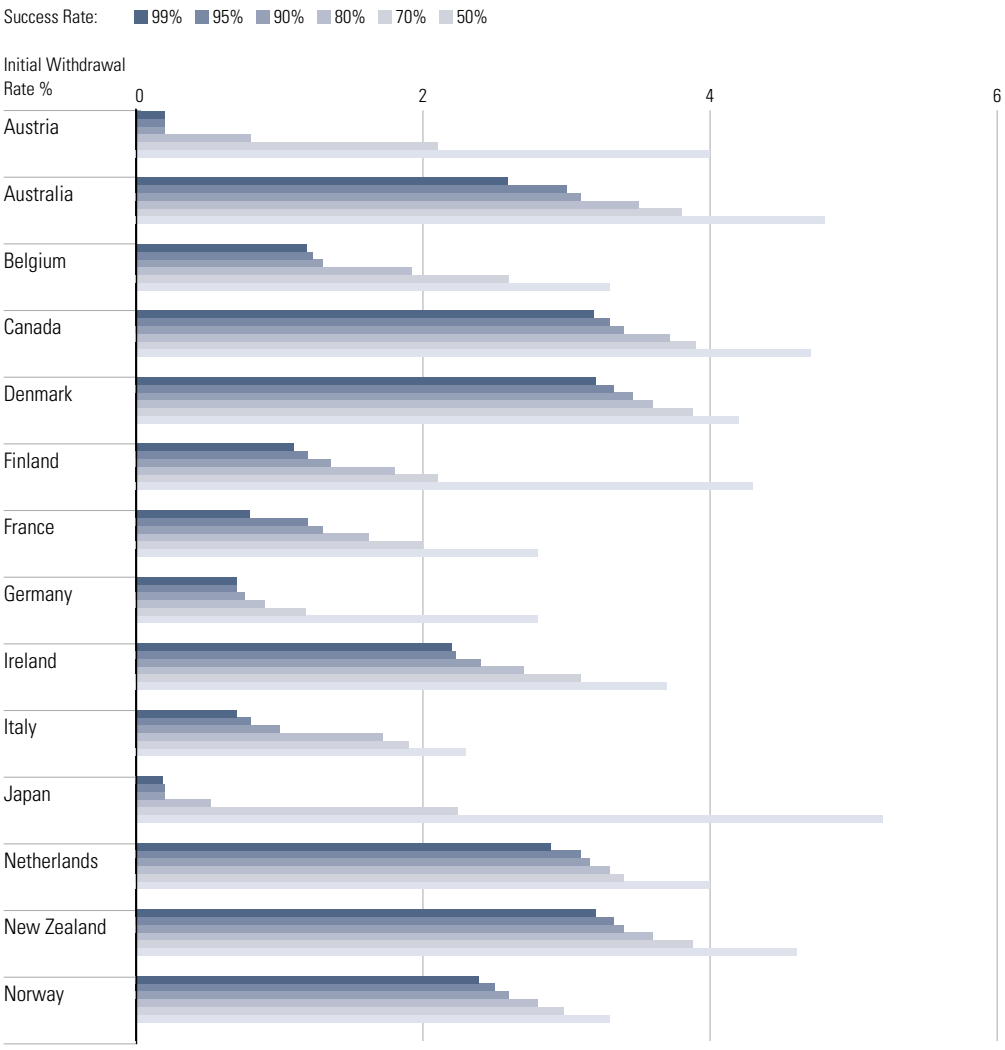
approach Bengen used to determine a 4% initial withdrawal rate was safe in U.S. would have resulted in the same approximate conclusion had historical Canadian return data been used.

While the historical U.S. and Canadian safe withdrawal rates have been relatively similar, there are notable differences compared to other countries. To provide an even greater perspective, we conduct the historical safe initial withdrawal rate analysis for each of the 20 countries in the Dimson, Marsh, and Staunton dataset. Exhibit 3 shows the results. The results in Exhibit 3 include the initial withdrawal for varying target probabilities of success and assume a retirement period of 30 years, a portfolio invested domestically in 50% shares and 50% bonds, and an annual portfolio fee of 1.0% of assets.

Exhibit 3 Safe Initial Withdrawal Rates at Various Target Success Rates by Country



Source: Morningstar and Dimson, Marsh, and Staunton.

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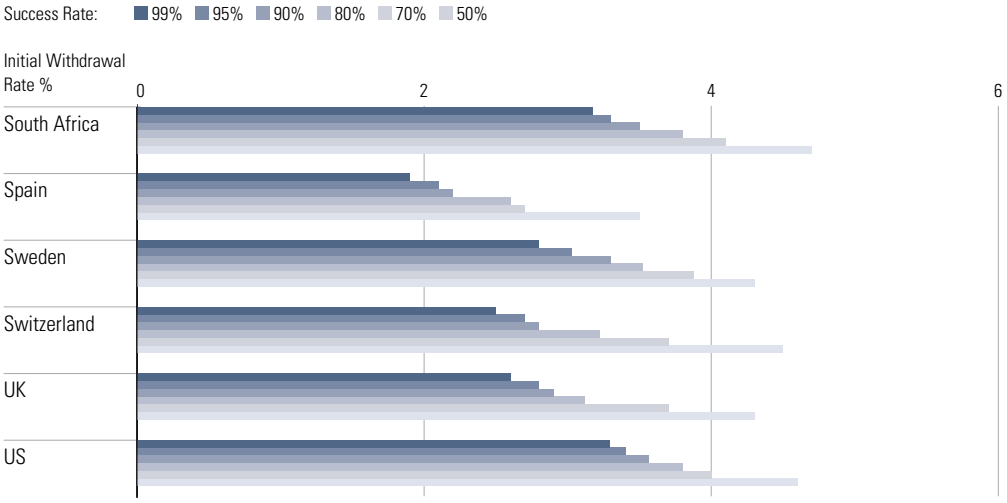
Exhibit 3 Safe Initial Withdrawal Rates at Various Target Success Rates by Country (Continued)



Source: Morningstar and Dimson, Marsh, and Staunton.

The true safe withdrawal rate varies significantly by country and target success rate. For example, using the historical returns in Japan, a 95% target success rate would yield an initial withdrawal rate of a mere 0.2%, while for the U.K. a 95% target success rate would yield an initial withdrawal rate of 2.8%. U.S. returns have yielded the highest initial safe withdrawal rates across the 20 countries historically, closely followed by Canada. This suggests safe withdrawal rates based on historical U.S. returns may be overly optimistic on a global basis. For example, based on the results in Exhibit 3, using the U.S. returns and targeting a 90% success rate yields an initial safe withdrawal rate of 3.6% in the U.S., slightly ahead of several other countries including Canada. The safe U.S. rate is the highest among the 20 countries and is considerably higher than the 20-country average of 2.30%.

The variability of international returns obviously plays an important role when determining safe withdrawal rates using historic data. This can be seen in Exhibit 4, which shows the historical inflation-adjusted (real) returns and risk for shares and bonds by country over the entire test period (from 1900 to 2015) as well as the returns for a 50/50 portfolio. While investors are likely to exhibit a home bias when building their portfolios, the impact of the variance in historic returns across countries is likely to be reduced by the use of international assets.

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Exhibit 4 Historical Inflation-Adjusted Returns and Risk by Country: 1900-2015

	Real Stock		Real Bond		50/50 Portfolio	
Country	Return	Std Dev	Return	Std Dev	Return	Std Dev
Austria	0.66	29.85	-3.80	50.96	1.24	30.51
Australia	7.29	17.88	1.67	13.15	4.96	12.26
Belgium	2.79	23.56	0.42	14.98	2.13	16.90
Canada	5.63	16.93	2.26	10.31	4.35	10.54
Denmark	5.54	20.78	3.21	11.83	4.79	13.94
Finland	5.43	29.84	0.20	13.63	3.64	18.14
France	3.25	23.05	0.20	12.98	2.29	15.11
Germany	3.29	31.57	-1.39	15.58	1.76	20.24
Ireland	4.42	22.90	1.55	15.02	3.52	16.51
Italy	2.04	28.43	-1.14	14.42	1.22	18.28
Japan	4.20	29.43	-0.88	19.59	2.56	20.50
Netherlands	5.00	21.31	1.69	9.75	3.94	11.95
New Zealand	6.16	19.34	2.11	8.97	4.55	11.91
Norway	4.21	26.77	1.85	11.98	3.72	15.56
South Africa	7.30	22.05	1.78	10.47	4.97	14.04
Spain	3.61	21.86	1.70	12.14	3.16	14.20
Sweden	5.89	21.09	2.69	12.68	4.88	13.26
Switzerland	4.48	19.42	2.35	9.39	3.80	12.28
UK	5.23	19.55	1.54	13.60	3.72	14.41
US	6.43	19.91	2.00	10.39	4.76	11.96
Average	**4.64**	**23.28**	**1.00**	**14.59**	**3.50**	**15.63**

Source: Morningstar and Dimson, Marsh, and Staunton.

Canadian investors have historically experienced returns that are notably above the average with considerably less risk. The real equity return of 5.63% ranks sixth out of 20, the real bond return of 2.26% ranks fourth, and the 50/50 portfolio real return of 4.35% ranks seventh. These above-average returns result in historical safe initial withdrawal rates that are approximately 1.0% higher than the international averages across different target probabilities of success.

Retirement Income in Canada

Canada's retirement income system has four pillars:[1]

1. The Canada Pension Plan and Quebec Pension Plan (CPP/QPP[2]) are public defined-benefit (DB) plans funded through mandatory employer-employee contributions. During the 1990s, the CPP shifted from a pay-as-you-go system to a pre-funded platform.

   Both the CPP and QPP are calculated based on an individual's annual earnings between the ages of 18 and 65 compared to the maximum pensionable earnings, which is calculated based on the national average industrial wage. The CPP uses the best 39 years' earnings while the QPP uses the

1 Based in part on Canada's Public Policy Forum (2015)
2 QPP is the Quebec plan. CPP covers all of the other provinces and territories

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best 40 years. The maximum monthly CPP and QPP pension amount is $1,092.50 in 2016, which is 25% of the current year's maximum pensionable earnings amount. However, the average monthly CPP amount paid out was $664.57 in January 2016. In order to qualify for the maximum amount, the earnings in each qualifying year must equal or exceed that year's maximum pensionable amount. It is possible to begin taking CPP as early as age 60, with payouts reduced by 0.6% for each month, to a maximum of 36%. It is also possible to delay the pension up to age 70, with payouts increased by 0.7% for each month, to a maximum of 42%.

2. Old Age Security (OAS) and the Guaranteed Income Supplement (GIS) are general tax-funded pay-as-you-go programs that provide nearly complete retirement income replacement for lower-income individuals, and a basic income floor for middle-income individuals. OAS eligibility is based solely on how long you have lived in Canada after the age of 18. To qualify for the maximum pension, you must reside in Canada for at least 40 years, although there are specific conditions that allow you to reside outside Canada but still qualify. The maximum monthly amount as of September 2016 is $573.37, however OAS payments are subject to clawback once annual earnings exceed $72,809, and are fully clawed back at $119,512 (thresholds as of 2016). The clawbacks are calculated based on earnings reported in the previous year's tax return (earnings include CPP/QPP plus other pension income, RRSP, investment income such as interest, dividends and capital gains, as well as any employment earnings). If an individual does not meet the 40-year residency requirement, a partial OAS pension is calculated at the rate of 1/40th of the full OAS pension for each complete year of residence in Canada after age 18. It is possible to delay taking the OAS pension up to age 70, with payouts increasing by 0.6% for each month, up to a maximum of 36%. It is not possible to start taking OAS before age 65.

   The GIS is a supplement that is available to very low income individuals. Along with a spouse's allowance and a survivor's allowance, they can raise the OAS maximum monthly payout of $573.37 up to a combined (OAS plus GIS) monthly amount of $1,429.76 (as of September 2016). The supplements are based on earned income, decreasing as income increases above $3,500 annually, and are fully withdrawn when the individual's or couple's income reaches a maximum threshold (currently $17,376 for individuals and $22,944 for couples where one partner receives the full OAS pension, with other thresholds for other situations).

3. Workplace pensions—There are two main types:

   Defined benefit (DB) plans provide guaranteed lifetime income after retirement, and are based on employment and salary history. They often include adjustments for inflation and benefits for a surviving spouse.

   Defined contribution (DC) plans are employer-sponsored tax-deferred savings plans such as Group RRSPs. They often have matching employer contributions.

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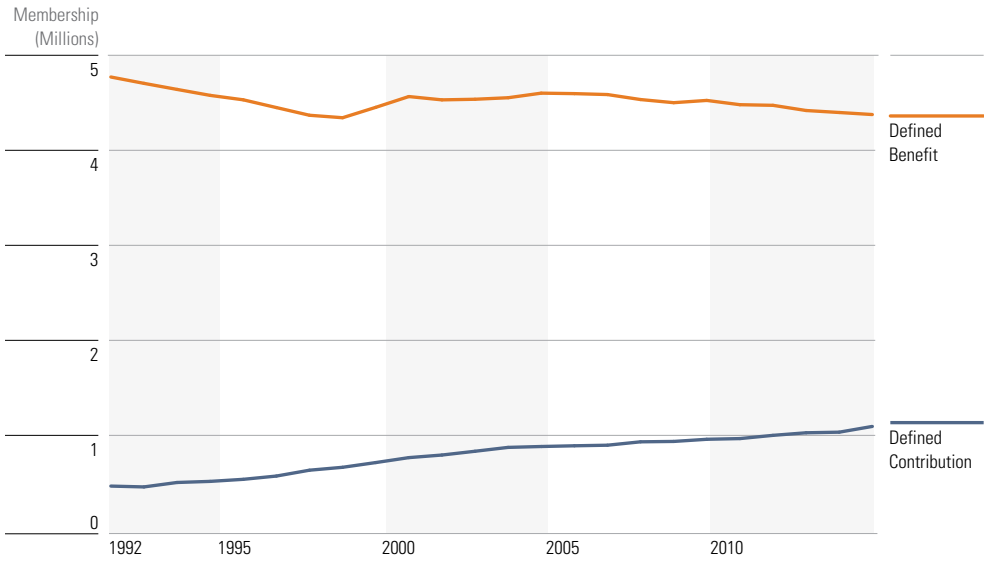
4. Discretionary individual saving consists of private savings that take advantage of tax-deferred vehicles such as Registered Retirement Savings Plans (RRSP) and tax shelters such as Tax-Free Savings Accounts (TFSA). These registered plans serve as a supplement to workplace pension plans, as do savings in non-registered accounts.

   According to a survey conducted by Statistics Canada, in 2014, more than 60% of Canadian employees lack workplace pensions and therefore must rely entirely on the government plans and discretionary individual savings, both tax-advantaged and taxable.[3] According to the same survey, public sector employees make up over 50% of employees with workplace pensions.

   Also, according to the survey, overall, 70% of employees are in DB plans and 17.5% are in DC plans, with nearly 87% of these employees being in the private sector. Thus, Canada still relies far more heavily on DB plans than some other countries such as the United States. However, as Exhibit 5 shows, over the period 1992—2015, membership in DB plans has fallen from 4,775,543 to 4,380,386 (a fall of 8.3%) while membership in defined contribution plans more than doubled, going from 469,111 to 1,097,211 (an increase of 133.9%) over the same period.[4]

Exhibit 5 Membership in Canadian DB and DC Plans: 1992—2015



Source: Statistics Canada (2016b).

3 According to a survey of pension plans carried out by Statistics Canada (2016a), "The pension coverage rate, the proportion of all employees covered by an RPP [registered pension plan], was 38.1% in 2014…"

4 In Statistics Canada (2016b), Membership is defined as active members of the pension plan currently making contributions to the pension plan or for whom contributions are being made

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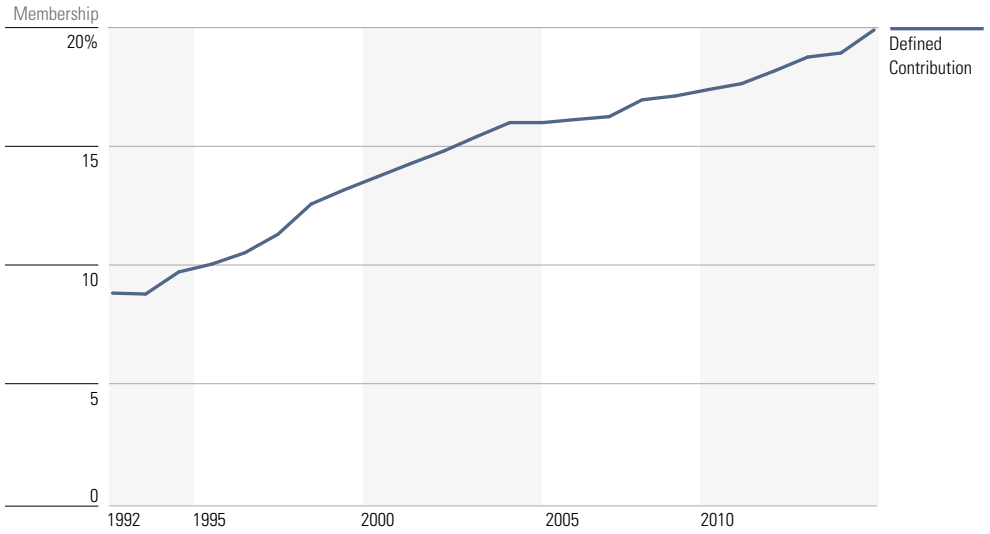
Exhibit 6 shows how this has impacted the percentage of employees in DC plans as a percentage of the total of those in DB and DC plans. Over this period, this percentage grew from 8.9% to 20.0% in 2015.

Exhibit 6 DC Membership as a Percentage of DB+DC Membership: 1992—2015



Source: Statistics Canada (2016b).

As for assets, Statistics Canada (2016b) provides data from 2007 to 2015. Over this period, DB and DC assets both grew, with DC assets growing by 39.7% and DB assets growing by 49.9%. However, DC assets as a percentage DB plus DC assets only grew from 4.2% to 4.5%. As Exhibit 7 shows, this is far lower than the percentage of assets in other countries with DC plans, especially the United States where this percentage is 43%. (The percentage of total retirement assets in Exhibit 7 for Canada is only 3%, versus 4.5% as previously noted, because the Exhibit 7 value for Canada only includes occupational plans.)

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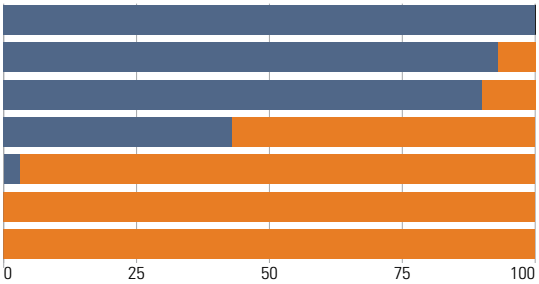
Exhibit 7 Share of Retirement Funding Scheme (DC vs DB), by Country

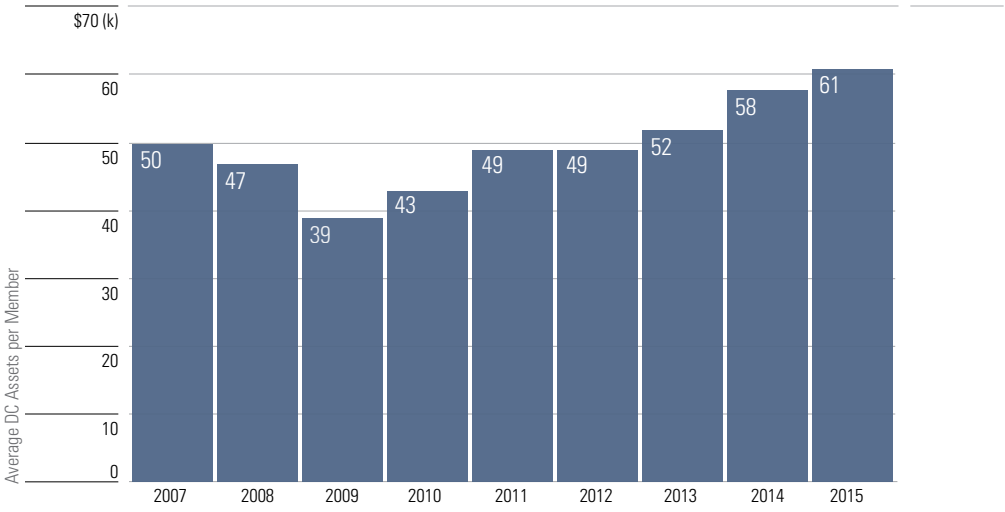
	Defined Contribution	Defined Benefit
France	100	0
Italy	93	7
Australia	90	10
United States	43	57
Canada	3	97
Germany	0	100
Switzerland	0	100



Source: OECD Global Pension Statistics.

As DC assets grew over the period 2007 to 2015, assets per employee also grew from $49,635 to $61,009 as we show in Exhibit 8.

Exhibit 8 Average DC Assets per Member: 2007—2015



Source: Statistics Canada (2016b).

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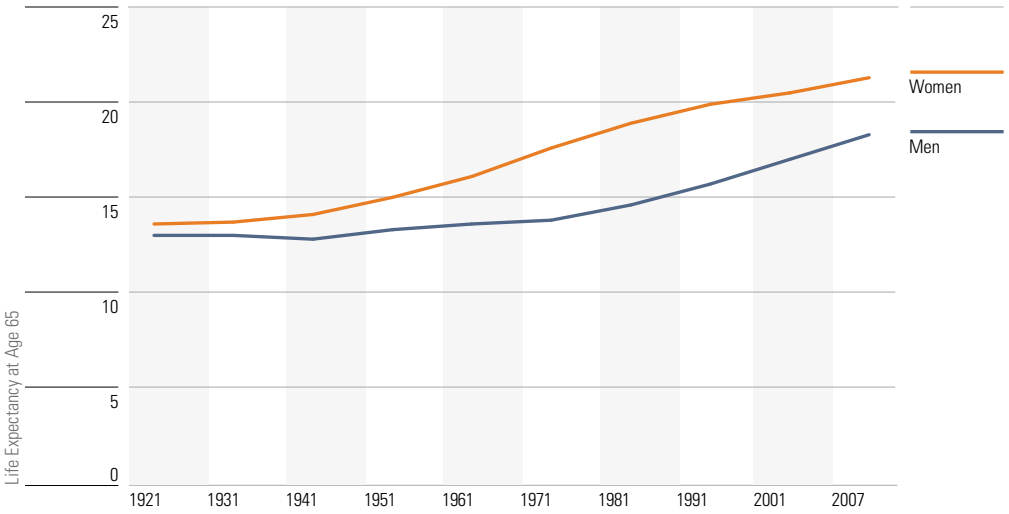
Longevity Risk

Another important risk when considering safe withdrawal rates is longevity risk. Exhibit 10 includes information about how life expectancy for someone who is 65 years old has changed in Canada from 1921 to 2007. Life expectancies have increased by 5.3 years for males and 7.7 years for females. In 2007, life expectancy for a 65-year-old was 18.3 years and 21.3 years for a male and female, respectively.

Exhibit 9 Life Expectancy for a 65-Year-Old (Years): 1922–2007



Source: Milan and Vézina (2011).

The life expectancies in Exhibit 9 are based on period life expectancy, which is the average number of years a person will live if the age-specific mortality rates at that point in time were to be applied for the rest of the person's life. The reality is that mortality rates are more than likely to improve in the future (as they have historically), so the periods are likely to underestimate the number of years someone could expect to live. The cohort life expectancy method considers assumptions of improvements in mortality rates over a person's lifetime. In other words, instead of being based on the mortality rates for all ages in a given year, the cohort life expectancy approach takes the age specific mortality rate year by year for the particular year in which the person would be that age. Projections based on both the period and cohort life expectancy methods are highlighted in Exhibit 10.

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Exhibit 10 Period and Cohort Life Expectancies in Canada

	Male				Female			
	2013	2025	2050	2075	2013	2025	2050	2075
At Birth (Newborn)								
Period	80.00	82.00	83.90	85.70	84.00	85.40	87.10	88.60
Cohort	86.10	86.90	88.60	90.10	89.10	89.90	91.30	92.50
Change	6.10	4.90	4.70	4.40	5.10	4.50	4.20	3.90
At Age 65								
Period	19.40	20.90	22.30	23.50	22.20	23.20	24.50	25.70
Cohort	20.90	21.70	23.00	24.30	23.30	24.00	25.30	26.50
Change	1.50	0.80	0.70	0.80	1.10	0.80	0.80	0.80

Source: Office of the Superintendent of Financial Institutions Canada (2014).

The information in Exhibit 10 suggests that life expectancy is likely to continue increasing into the future, which is a factor in lifetime income planning.

Canadian Equity Market Characteristics

The Canadian stock market represents only approximately 3% of global markets. It follows that investment opportunities in Canada are limited when compared to global markets. Exhibit 11 includes information about how the weights of several sectors vary for the Canadian stock market (as proxied by the Morningstar Canada index) versus the world (as proxied by the Morningstar Global Markets index).

Exhibit 11 Sector Weights in Canada versus the World

GICS	Morningstar Canada	Morningstar Global Markets	Difference
Energy	20.40	6.23	14.17
Materials	14.89	5.49	9.40
Industrials	9.19	11.60	–2.41
Consumer Discretionary	6.45	12.45	–6.01
Consumer Staples	4.52	9.91	–5.39
Healthcare	0.77	11.97	–11.20
Financials	35.40	20.72	14.67
Information Technology	3.00	14.46	–11.46
Telecom Services	2.67	3.50	–0.83
Utilities	2.69	3.51	–0.82

Source: Morningstar. Portfolio Date: 08/29/16.

There are some notable differences in the sector allocations for Canada when compared to the global market. Canada has a significant overweight in energy and financials and an underweight in to health care and information technology. There is also significant specific-issuer concentration in Canada, with the largest 25 companies comprising more than half the total market capitalization of the Canadian stock market as of August 29, 2016.

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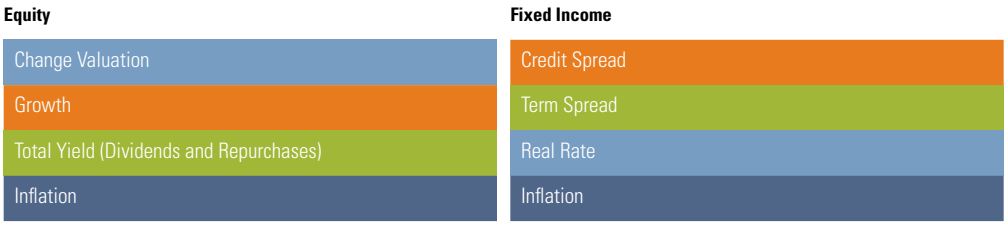
Return Expectations

It is impossible to predict the future. What we can do, however, is create a series of long-term valuation-implied returns based on the current prices of assets. While using historical returns is sometimes viewed as a simpler path than attempting to forecast returns, we believe using forward-looking returns is the best approach since it incorporates today's market conditions. These projections are more relevant in determining safe withdrawal rates than historical returns, which tend to be higher.

Morningstar creates valuation models for a large number of assets including cash, domestic and international fixed interest, domestic and international property, and domestic and international shares. We use a supply-side building-block approach to create valuation-implied projected returns. First introduced by Diermeier, Ibbotson, and Siegel (1984), and later adapted to stocks by Ibbotson and Chen (2003), the supply-side model is based on the idea that equity returns can be decomposed into underlying economic and corporate fundamentals. Fixed-income returns are derived using a similar approach based on expectations for cash rates, inflation and credit spreads. These long-term expectations are then modified to reflect the current deviation of the asset class from Morningstar's estimate of fair value. These concepts are displayed visually in Exhibit 12.

Exhibit 12 Building Blocks for Equity and Fixed Income Returns



Source: Morningstar.

Long-term returns for most capital markets are generally estimated to be lower than observed in the last century. This is particularly the case within equities where above-average valuations in many markets have diminished future return expectations. Interest-generating assets are also being affected by lower prevailing market yields. Morningstar uses several valuation models to estimate the fair value as our research suggests that a combination of multiple valuation measures has a significantly better predictive power than any single model. Specifically, our valuation models rely on several forward-looking measures of normalized earnings such as profit margins, return on book-equity and inflation-adjusted average earnings over the business cycle. Other equity building blocks incorporate earnings growth, total yield (dividends and buybacks) and inflation. Having estimated the fair value of the equity asset classes, we assume that prices revert to fair value over a 10-year period.

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Exhibit 13 includes information about our projected returns for a variety of asset classes. Inflation is assumed to be 2.0%.

Exhibit 13 Arithmetic Return and Risk Assumptions for Various Investments for Canada

Asset Class	1-10 Yr	11-20 Yr	20+ Yr	Standard Deviation
Cash	1.26	2.63	1.94	1.34
Canadian Short Term Bonds	1.95	3.82	2.88	3.92
Canadian Long Term Bonds	2.15	4.31	3.23	11.68
Canadian Real Return Bonds	1.30	3.66	2.48	10.09
Global Bonds	1.74	3.82	2.78	5.16
Canadian Equities	6.26	8.92	7.59	15.25
U.S. Equities	3.93	9.25	6.59	14.54
EAFE Equities	6.19	8.57	7.38	14.75
Emerging Market Equities	10.52	9.51	10.02	24.29

Source: Morningstar. Arithmetic returns are used in the return projections. The returns shown are before fees, taxes and inflation.

Safe Withdrawal Rates… A Forward-Looking Perspective

Using the expected returns from Exhibit 13, we have run additional forecasts to determine safe withdrawal rates for Canadian retirees. The portfolios used in these examples are built on a more diversified combination of asset classes than used in the previous simulations. Some of the potential allocations are shown in Exhibit 14.

Exhibit 14 Portfolio Allocations

	Equity %					
Asset Class	0	20	40	60	80	100
Cash	12.50	10.00	7.50	5.00	2.50	0.00
Canadian Short Term Bonds	56.25	45.00	26.25	13.00	4.50	0.00
Canadian Long Term Bonds	18.75	15.00	15.75	13.00	7.50	0.00
Canadian Real Return Bonds	12.50	10.00	7.50	5.00	2.50	0.00
Global Bonds	0.00	0.00	3.00	4.00	3.00	0.00
Canadian Equities	0.00	8.00	15.00	21.00	26.00	32.50
U.S. Equities	0.00	6.60	13.75	21.45	29.70	37.13
EAFE Equities	0.00	4.20	8.75	13.65	18.90	23.63
Emerging Market Equities	0.00	1.20	2.50	3.90	5.40	6.75
Total	**100**	**100**	**100**	**100**	**100**	**100**

Source: Authors' calculations.

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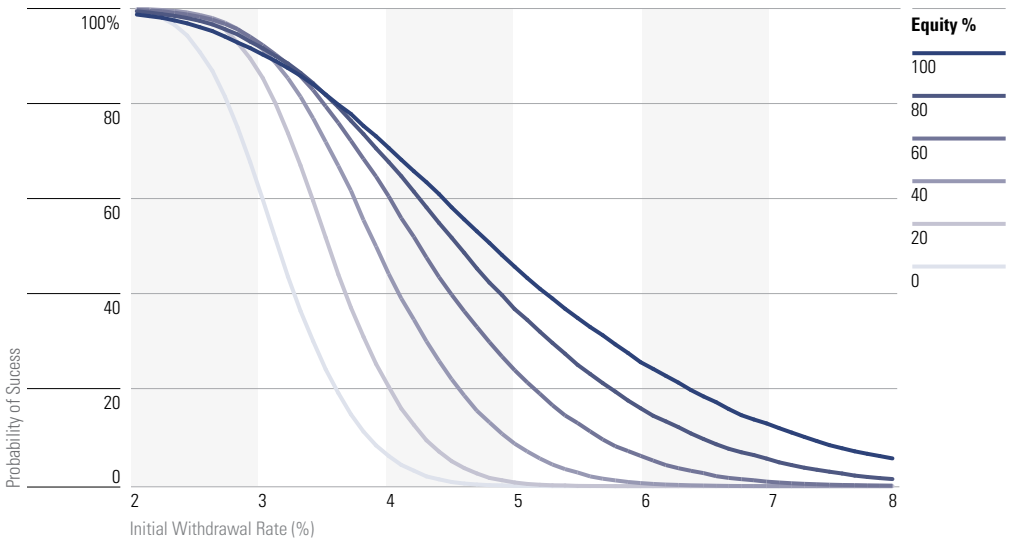
Exhibit 15 includes information on the probability of success for various initial withdrawal rates based on different equity allocations (0% to 100% in 20% increments), under the assumption that retirement lasts 30 years.

Exhibit 15 Success Rates for Various Initial Withdrawal Rates and Portfolios (30-year retirement period)



Source: Authors' calculations

As shown in Exhibit 15, portfolios with higher allocations to equities have higher initial withdrawal rates but also tend to have more risk. Therefore, it's important to balance the potential for a lower initial required savings amount (i.e., higher initial withdrawal rate) with the additional risk incurred during retirement. Most retirees are uncomfortable taking excessive risk in their portfolios. Therefore, it's important to strike a good balance between the two.

Exhibit 16 includes information on the probability of success for various initial withdrawal rates based on different retirement periods, under the assumption that the portfolio is invested in 40% equities and 60% bonds. The chart illustrates the large impact the retirement period can have on the initial withdrawal rate, in particular the jump from 20 to 30 years. At the 80% probability level, increasing the retirement period from 20 to 30 years reduces the initial withdrawal rate by approximately 27% (4.7% to 3,4%). Similarly, the probability of success for a 4% initial withdrawal rate is 96% for a 20-year period, 45% for a 30-year period, and 17% for a 40-year period.

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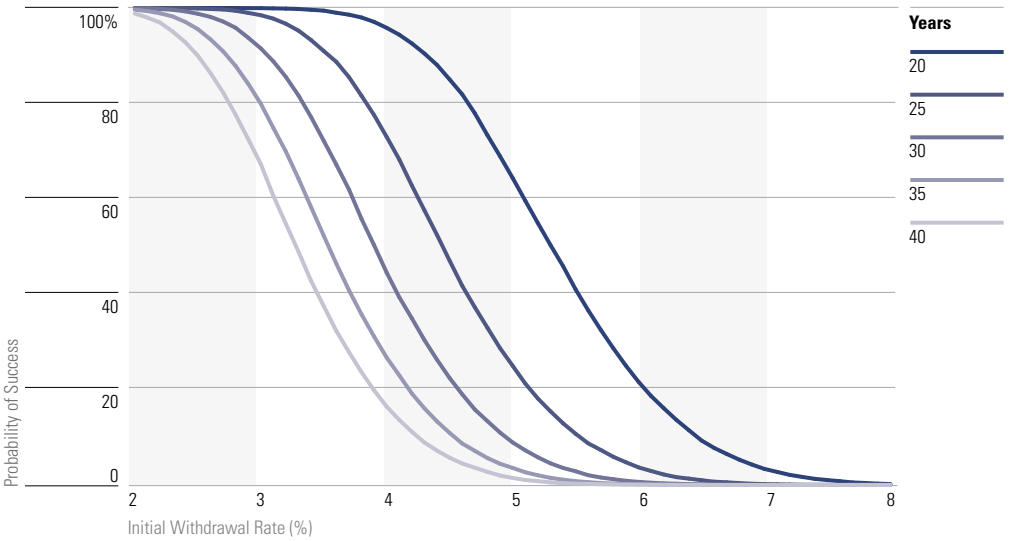
Exhibit 16 Success Rates for Various Initial Withdrawal Rates and Retirement Periods (40% equities and 60% bonds)



Source: Morningstar.

Exhibit 17 has been provided to include additional information about specific appropriate withdrawal rates for different portfolio allocations, retirement periods, and target success levels.

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Exhibit 17 Withdrawal Rates by Portfolio Risk Level, Time Period, and Target Probability of Success Rate

Portfolio % / Probability of Success %	**Retirement Period** (Years) 20	25	30	35	40
0% Equity					
99	3.3	2.5	2.1	1.8	1.5
95	3.6	2.8	2.3	2.0	1.8
90	3.8	3.0	2.5	2.1	1.9
80	4.0	3.2	2.7	2.3	2.1
70	4.2	3.4	2.8	2.5	2.2
50	4.5	3.6	3.1	2.7	2.4
20% Equity					
99	3.6	2.8	2.4	2.1	1.9
95	4.0	3.2	2.7	2.3	2.1
90	4.2	3.3	2.8	2.5	2.3
80	4.4	3.6	3.1	2.7	2.4
70	4.6	3.7	3.2	2.8	2.6
50	4.9	4.0	3.5	3.1	2.8
40% Equity					
99	3.5	2.8	2.4	2.1	1.9
95	4.0	3.3	2.8	2.5	2.3
90	4.3	3.5	3.0	2.7	2.4
80	4.6	3.8	3.3	2.9	2.7
70	4.8	4.0	3.5	3.1	2.9
50	5.3	4.4	3.9	3.5	3.2

Portfolio % / Probability of Success %	**Retirement Period** (Years) 20	25	30	35	40
60% Equity					
99	3.4	2.7	2.3	2.1	1.9
95	4.0	3.2	2.8	2.5	2.3
90	4.3	3.5	3.1	2.8	2.6
80	4.7	3.9	3.4	3.1	2.9
70	5.0	4.2	3.7	3.4	3.2
50	5.6	4.7	4.2	3.9	3.6
80% Equity					
99	3.1	2.5	2.1	1.9	1.7
95	3.8	3.1	2.7	2.4	2.3
90	4.2	3.5	3.1	2.8	2.6
80	4.7	4.0	3.5	3.2	3.0
70	5.1	4.4	3.9	3.6	3.3
50	5.9	5.0	4.5	4.2	3.9
100% Equity					
99	2.8	2.2	1.9	1.7	1.6
95	3.6	3.0	2.6	2.3	2.1
90	4.1	3.4	3.0	2.7	2.5
80	4.7	4.0	3.5	3.3	3.0
70	5.2	4.5	4.0	3.7	3.5
50	6.1	5.3	4.8	4.5	4.2

Source: Authors' calculations.

The initial savings required to fund retirement can be estimated by taking 1 divided by the target initial withdrawal rate. For example, if 4% is the assumed safe withdrawal rate, the initial savings required to fund the retirement income goal would be 25 times that income need (1/4%=25x). The initial withdrawal rates in Exhibit 17 differ significantly for the various portfolios. Longer retirement periods, higher probabilities of success, and more conservative portfolios tend to yield lower initial sustainable withdrawal rates.

For example, assuming a 40% equity portfolio and a 30-year retirement period, a 99% probability of success yields an initial sustainable withdrawal rate of 2.4% (1/2.4%=42x multiple) versus an initial rate of 3.9% (1/3.9%=26x multiple) for a 50% probability of success, which are significantly different levels of required savings. Overall, the results in Exhibit 17 suggest the actual level of required savings to fund retirement is a very personalized and complex decision where a financial adviser has the potential to add significant value.

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Implications

How should retirees and financial advisers use this research? First, the assumed retirement period should vary by client. For instance, a 30-year time horizon is ideal for a hypothetical 65-year old retiree who dies at age 95. But based on the life tables, remaining life expectancy at age 65 is less than 30 years (approximately 21 years), so many will die with money unspent. Our simulations with retirement lasting over 30 years resulted in some relatively low safe initial withdrawal rates; however, it may be possible to hedge this longevity risk through annuitization (the pooling of longevity risk).

Most retirees will also not need to spend the same amount every year. For couples, the longer-lived member won't spend as much as a single-person household. Retirees generally decrease spending as they experience physical and mental limitations throughout retirement, although spending may rise later in life due to medical costs. In addition, most retirees are willing to cut spending a little when markets don't do as well as they'd hoped. Incorporating variability into spending can increase the safe initial withdrawal rate significantly.

The probability of success is only one way to measure outcomes for a retiree. It fails to show the magnitude of the failures early in retirement, and it doesn't consider the security of retirees who live well beyond the 30-year timeframe. By neglecting to consider the magnitude of failure, portfolio risk is increased, leaving retirees vulnerable to adverse market events, particularly those early in retirement.

The results of this analysis suggest that a safe initial withdrawal rate for a heterosexual couple, both age 65, who invest in a balanced portfolio (with 40% equities) with a reasonably high target probability of success (80%), is approximately 3.3% (assuming retirement lasts 30 years). A 3.3% initial withdrawal rate means retirees need approximately 30.3 times the portfolio income goal. (1/3.3%=30.3). For example, if the retirees wanted $10,000 of income per year during retirement, increased annually by inflation, the required balance initial balance would be approximately $303,000.

It is interesting to compare this result with the cost of obtaining a similar amount of lifetime available through an immediate payout annuity. According to a quote from CANNEX, as of a 11 October 2016, an immediate payout annuity for a heterosexual couple, both age 65, with a fixed 2.5% annual increase, had a payout yield of 3.5%. Hence, the cost of obtaining $10,000 in the first year with 2.5% annual increases would have been about $285,700, which is almost 6% less than the required initial balance needed for the withdrawal strategy. Of course, the comparison is not perfect (30 years vs. lifetime, 80% chance of success vs. guaranteed, and annual increases with inflation vs. a fixed 2.5%).

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Conclusions

This paper provides a relatively comprehensive overview of safe withdrawal rates for retirees based on both historical returns and forward-looking returns. Overall these findings suggest that safe withdrawal rates in Canada are lower than found in prior research— the lower end of the range now starts towards 2.5% or 3.0% and not the previous 4.0%. The generous capital market returns of the prior century that bolstered a comfortable and long-lasting retirement portfolio may give 21st-century retirees a false sense of security.

The paper also highlights the way probability of success can be used to understand potential outcomes. While expected returns are a mid-point operating at the 50% probability of success, our definition of "safe withdrawal" has been calculated in the range of 70% to 99% success. Helping retirees understand the certainty of retirement incomes in this context is an important step to better meeting expectations.

While this analysis provides a useful framework to consider the question of retirement spending, it also highlights the importance of understanding the specific needs and preferences of a retiree in framing investment objectives.

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