

# CALU SPECIAL REPORT | AUGUST 2014



#### August 2014

# **CALU Special Report**

# Rethinking RRIF Withdrawals: New Rates and Methodologies for New Realities

#### by Moshe A. Milevsky<sup>1</sup>

#### **Overview**<sup>2</sup>

Over the past decade much has been written and said about the Income Tax Act (the "Act") rules that require an increasing amount to be withdrawn from a Registered Retirement Income Fund (RRIF) as the RRIF holder ages.

CALU is pleased to have received permission to distribute the following article, which highlights legitimate concerns with the current payout rules, and recommends a new formula based on a lifecycle consumption smoothing model as well as an approach for ensuring that the RRIF minimum rules are updated on a regular basis. Such an updating process would both protect the retirement income of elderly Canadians while also ensuring that the government receives its fair share of taxes.

CALU will make a submission recommending the updating of the RRIF minimum rules as part of the House of Commons Standing Committee on Finance 2015 pre-budget consultations. This article, combined with the work of CALU Committees and others, provides important support for urgent changes to the RRIF minimum formula as well as a mechanism to make sure this formula remains viable in the future. This in turn will protect the interests of retirees as well as the federal and provincial governments, who are looking to recoup the tax benefits associated with contributions to registered retirement savings plans.

#### Introduction

This paper examines the Registered Retirement Income Fund (RRIF) required withdrawal schedule, a.k.a. "required minimum distributions" (RMDs) in the context of current interest rates and increasing longevity. I argue that today's demographic and economic realities require that the schedule and methodology be revised to remain economically justifiable. I compare and contrast the current RRIF RMD schedule with an optimal withdrawal schedule from an economically driven lifecycle consumptionsmoothing model (LCM). The current RMD schedule is also evaluated by modeling the outcomes if current withdrawal rates were applied to the economic and demographic conditions prevailing in the late 1980s, when these rates were designed. So, while the LCM can indeed justify the RRIF rates put in place during the early 1990s, 20+ years later they have become outdated and should be revised. In terms of fixing this problem, my policy recommendation is clear, simple and transparent. Link RRIF rates to market-driven annuity payout rates, which automatically adjust to both interest rates and demographic changes.





In terms of background, starting at the age of 71, all Canadians must begin *withdrawing* money they have saved up and accumulated in their tax-sheltered Registered Retirement Savings Plans (RRSP)<sup>3</sup> by (i) using the balance in the RRSP account to purchase a life annuity, (ii) converting the RRSP to a Registered Retirement Income Fund (RRIF), and then making yearly withdrawals in accordance with a rigid schedule, or (iii) some combination of (i) or (ii).<sup>4</sup>

Under the withdrawal rules, at the age of 71 at least 7.38% of the value of the account at the outset of the year must be withdrawn before the end of the year. This *required minimum distribution* (RMD) rate increases with age, with the result that by age 85 at least 10.33% of the account value at the beginning of the year must be withdrawn – and by age 95 the RMD rate is 20%.<sup>5</sup>

Canadian retirees know that in the current economic environment, if they want a very safe (risk-free) location for their investments, they can expect to earn between 1% and 2% in nominal returns, or effective real returns of zero and possibly negative (after inflation).<sup>6</sup> Taken together, the high required RRIF withdrawal rates, coupled with low real returns on safe investments, mean that many RRIF accounts are depleted rapidly – just as Canadians must collectively plan for longer lifetimes. Unsurprisingly, the current RMD rules are intensely disliked by the approximately five million Canadians who are above the age of 65 – the fastest-growing segment of the Canadian population, expected to double in the next 25 years – many of whom are faced with converting their RRSPs to RRIFs in the near term.<sup>7</sup> Surveying the RMD rules and the effective rates on safe investments, and contemplating rising longevity rates, the question asked by the retirees of today and tomorrow (and echoed by the media) is: Aren't these *mandated RRIF withdrawal rates too high?* The answer is a somewhat obvious and intuitive, yes, but I also offer a more rigorous **why** and some suggestions on how this should be fixed.

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In terms of methodology, I employ the *lifecycle model* (LCM) of saving and consumption to argue that the current withdrawal rates cannot be justified in today's environment of ultra-low interest rates and increasing human longevity: current RMD rules force retirees to draw down wealth at a faster rate than prudence or caution would allow. For example, a 71-year-old retiree with \$100,000 in their RRIF, earning a meager 1.5% nominal interest per year (at a generous bank) and adhering to the RMD rate schedule would be left with only \$7,878 in the account by the age of 95 – and the required schedule of withdrawals would cause the rapid decline of the account between the ages of 71 and 95. In contrast, under a 6.5% interest rate (which is now but a relic of the past<sup>8</sup>) withdrawal amounts actually would be rather stable, hovering between \$7,000 and \$8,000 for 25 years. (See Appendix A for a

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comparison of the withdrawal schedules and resulting cash flows using interest rates of 1.5% and 6.5%.)

Of course, defenders of the status quo (and certainly those interested in maximizing tax revenue) might argue that RMDs are "red herrings" since retirees are not required to consume the withdrawn funds (but merely to withdraw them from the tax-protected shelter of the registered account). However, there is some element of forced spending if one carefully considers the tax implications: first, after withdrawing the funds, a retiree must pay income tax on the withdrawals at their marginal tax rate. They can then use the (after-tax) funds to re-purchase the same investments, which, it then follows, would mean they then earn after-tax returns on these investments outside of the tax shelter. However, this *premature taxation* delivers a double-whammy hit to the growth of the portfolio, as tax is initially due on the withdrawals – and then any gains (in the non-registered account) are also subject to taxation. And to add insult to injury, the (early, high) required withdrawals, when included in yearly income, may result in "recovery" (clawback) of the Guaranteed Income Supplement and/or Old Age Security (OAS) per the provisions of the Act.

Interestingly, the current RMD rules for ages 71 and older were announced in the 1992 federal budget, responding to concerns (and consultations during the late 1980s) that under rules then in place, "RRIFs cannot provide a life income for the substantial number of RRIF holders who can be expected to live beyond age 90."<sup>9</sup> The pre-1992 rules required that a RRIF holder withdraw a minimum amount each year equal to the start-of-year balance divided by "90-minus-age," and in the year the RRIF holder attained age 90, the full balance at the beginning of the year must be withdrawn – meaning the account was fully depleted in the year the RRIF holder reached age 90. The new schedule for withdrawals, which provides for gradually increasing withdrawals from ages 71 to 94, followed by a constant 20% withdrawal rate for ages 95 and beyond, was intended to "permit RRIF withdrawals to extend over the life of the RRIF holder" (and to "provide a basic level of protection from the effects of inflation.")

As the original intent of the regulations behind the current RMD rules was not only to limit deferral of income taxation, but also spread personal pension payments (relatively evenly) over the retiree's remaining lifespan, the main policy argument in this paper is that under the current rules this intention is not being fulfilled. So, as in 1992 when the rules were last updated to reflect then-current realities, the RRIF withdrawal rates should (i) be updated once again to account for current economic and demographic changes over time and (ii) perhaps, as a permanent solution, link them to an index that changes with interest rates and other relevant market conditions.<sup>10</sup> In the remainder of this paper, I lay out a suggested approach for rethinking RRIF RMDs: namely, optimal spending rates in an economic lifecycle model. And, I conclude with the high-level suggestion on how the RMD rules can be linked to annuity rates, which automatically adjust to interest rates and demographic conditions.

#### The Lifecycle Model at Retirement

The lifecycle model (LCM) concept is closely associated with the work of Franco Modigliani in the 1950s and 1960s, although it can ultimately be traced back to the writing of Irving Fisher in the 1920s. The model starts with a theory to postulate how rational people save and spend their money as they age through the lifecycle. The main practical insight of the LCM is the idea that rational people will choose to spread out or *smooth their consumption* over their lifetime, in accordance with their individual preferences for consumption now vs. later, and their attitudes towards all types of risk. A practitioner of "consumption smoothing" will try their utmost to even-out any bumps and kinks in their income by saving/borrowing





to create a stable standard of living over time. So, for example, if a consumption smoother (or LCM devotee) expects to earn \$30,000 in salary income this year and \$10,000 in salary income the next, they would smooth this "bumpy" income by consuming \$20,000 in each year – which means saving \$10,000 (a third of their income) in year one and spending 100% more than their income in year two.<sup>11</sup> As its name suggests, the lifecycle model is an idealized *theory* about the rational distribution of resources over the human lifetime – and in many cases, observed reality in respect of how people behave with their money is quite distant from lifecycle theory, hence the growing literature in the field of behavioral economics.

And, while real people might not behave according to the tenets of the LCM, most economists would agree that the lifecycle model presents a very efficient framework for giving (normative) financial advice.<sup>12</sup> How does the lifecycle model help us in planning for spending in retirement? Within the context of retirement spending with uncertain lifespans, LCM suggests that rational consumption-smoothers should balance out the *low-probability risk of living a very long time* against the *utility (or enjoyment) of consuming earlier*.<sup>13</sup>

One of the many insights from LCM is that the amount of any pre-existing pension annuity income should significantly impact the optimal spending and consumption plan of a retiree. Life annuities and optimal consumption rates are intertwined in the lifecycle model. The basic concept is this: if a retiree has more pre-existing pension income, they can afford to spend more from the nest egg (i.e., withdraw more from a RRIF) – as they know that in the event they live much longer than average, into their late 90s and perhaps to centenarian territory, the pension income will still be there. Additionally, a retiree's planned consumption will also depend, the LCM tells us, on their specific or individual preference for consuming now versus consuming later. Taken together, we can see that advice or recommendations about

withdrawal rates (and a mandatory RMD schedule) are meaningless without having a better understanding of (i) the typical retiree's other income (i.e., what fraction is available as longevity-insured or pension income), as well as (ii) what we might think of as their *longevity risk aversion* (i.e., whether they are concerned about living to an advanced age), in addition to their attitudes towards other kinds of risk. Note that some retirees might not worry about a 5% chance of living to 100 (or, alternately, a 5% chance of losing 50% of their nest egg) while others are more risk-averse and will include these low-probability outcomes in their planning. The bottom line is that risk attitudes are relevant, as they affect consumption in retirement!

### A Numerical Example: Now vs. Then

So much for theory, here are some examples. Let's take the case of a generic 70-year-old retiree with \$200,000 in her RRSP, which she is anticipating converting (next year) into a RRIF. Our retiree has preexisting pension income (from the Canadian Pension Plan [CPP], or a small defined benefit pension from her previous employment), totaling \$10,000 per year. (These numbers are reasonably close to estimates provided by Statistics Canada for retirees and then rounded for convenience.<sup>14</sup>) Let us further assume that our 70-year-old (in the year 2014) has a 'modal lifetime' of 92 – which is the age at which she is most likely to die – and a corresponding 28% probability of surviving to the age of 95. Finally, I assume that the real (afterinflation) interest rate available on safe investments is 1.5% per year – obviously higher rates may (or may not) be anticipated from holding riskier equity-based investments and mutual funds, but I assume this retiree is a highly risk-averse investor who also has an objective to smooth her total retirement spending.<sup>15</sup>

According to the principles of LCM, this retiree would be advised (by a financial economist) to consume a total of \$19,110 at the current age of 70: this is the "optimal spending" for age 70 that would smooth

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#### Table 1

Optimal RRIF Spending Rates in an Economic Lifecycle Model							
RRIF Value at 70:	\$200,000						
Pension Income:	\$10,000						
Survival to Age 95	28% chance						
REAL Interest Rate:	1.50%						
Longevity Risk Aversion:	High (=8)						
		-	OPTIMAL	TOTAL			
<b>Current RRIF Rates</b>	Age	<b>RRIF</b> Value	Withdraw (%)	Spending			
5.00%	70	\$200,000	4.55%	\$19,110			
7.38%	71	\$193,960	4.69%	\$19,080			
7.48%	72	\$187,860	4.84%	\$19,050			
7.85%	75	\$169,200	5.27%	\$18,950			
8.75%	80	\$137,128	6.35%	\$18,675			
12 620/	90	\$72.073	10.40%	\$17,484			
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age of 80 and then 10.40% at the age of 90. So, indeed the optimal rates increase with age; but, the key here is to notice that these mathematically optimal- or LCMderived rates are *much lower than the RMDs*, which range from 5% to 13% over the same period. For example, at age 71 the RMD is 7.38%, versus the 4.69% the LCM suggests. The results of the two schemes – smooth withdrawals and current RMDs – are displayed and compared in Table #1.

Interestingly, a recent study in the United States conducted by financial economists using a similar LCM model but working

resources over her remaining lifecycle. The \$19,110 would be comprised of \$10,000 in pension income and \$9,110 from the portfolio. Note that this "smooth" spending rate leads to an *optimal withdrawal rate* from the RRIF of 4.55% at the age of 70. Then, next year, at her age 71, our financial economist would advocate an optimal spending rate of (a slightly lower) \$19,080 per year, of which \$10,000 would again be sourced from pensions and \$9,080 from the investment portfolio which gives an optimal withdrawal rate of 4.69% (and the exercise can be repeated for each following year to the modal lifespan of 92 years). You can see that the optimal spending rate (in the LCM world) minus the yearly income from the (CPP or DB) pension leads to the optimal withdrawal rate from the RRIF. Think of the RRIF withdrawal rate or amount as fulfilling the financial "leftovers" to meet the smoothed consumption that must be sourced from the RRIF.

As noted above, the smoothing process continues each year – and the optimal withdrawal rates increase slowly to 5.27% at the age of 75, then 6.35% at the with U.S. RMDs, claimed that the RMDs in the United States are in fact nearly optimal and should be used as a guidepost for withdrawals.<sup>16</sup>

A caveat in these LCM models is that they have been calibrated and implemented using average (healthy) mortality rates and relatively risk-averse retirees who prefer to invest in safe cash assets. A retiree who is (i) unhealthy, or (ii) more (investment) risk-tolerant – and/or (iii) prefers higher consumption today vs. tomorrow – would select, if offered the choice, a different path and schedule for their RRIF withdrawals. In fact, in a Canadian study investigating wealth and spending patterns in retirement, economist Kevin Milligan (2005) claimed that some Canadians were actually withdrawing more than the mandated amount from their RRIF:<sup>17</sup> So, clearly not everyone in Canada finds the current RMD schedule "constraints-binding," in the language of economics.

However, as a sanity check to the claim the RMD rates are too high in 2014, one can "run" the same exercise (see Table 2) using late 1980s interest rates (much





higher, at 4% real) and demographic assumptions (only one retiree in 15 survives to age 95). With these inputs, which reflect the demographic and economic realities of the day, not surprisingly, the optimal withdrawal rates are much higher – and coincidentally closer to the current RRIF RMD rates. For example, at the age of 71 the same LCM-wielding financial economist would suggest a 7.27% withdrawal rate to our hypothetical retiree, compared to the 7.38% required now by law. And at the age of 90, the optimal withdrawal rate would be 16.2%, which is actually a few percentage points higher than the currently mandated 13.62%.<sup>18</sup>

So, whereas Ottawa would have been "generous" (in the late 1980s or early 1990s) using the financial economic lifecycle model as a benchmark for RMDs, allowing retirees to take RRIF balances into income and spreading RRIF withdrawals over a (comparatively) shorter collective lifespan in retirement, this generosity has evaporated by 2014 – but not as a result of any deliberate policy change. Here is the bottom line result from this analysis: it's time to rethink the RMDs to bring them in line with 21st century reality.

What are the implications if the current RMD schedule is maintained? There are two of note: first. Canadians over 65, as previously mentioned, form the fastestgrowing segment of the Canadian population. In addition, longevity for Canadians over the age of 65 is increasing and will continue to increase at a more rapid pace than for the rest of the population, and recent projections suggest Canada will continue to have one of the highest life expectancies of the world, along with Japan, France, Switzerland, Italy and Australia.<sup>19</sup> Ultimately the current RMD schedule, if maintained, will impact a subset of the Canadian population that is growing more quickly both in terms of population numbers and expected longevity than any other group. Secondly, if the retirees of today and tomorrow are required to draw down and pay tax on RRIF income at rates that can be expected to deplete

#### Table 2

Optimal RRIF Spending Rates in an Economic Lifecycle Model: (Assuming 1980s interest rates and longevity patterns)						
RRIF Value at 70:	\$200,000					
Pension Income:	\$10,000					
Survival to Age 95	7.0%					
REAL Interest Rate:	4.00%					
Longevity Risk Aversion:	High (=8)					
			OPTIMAL	TOTAL		
Current RRIF Rates	Age	<b>RRIF</b> Value	Withdraw (%)	Spending		
5.00%	70	\$200,000	7.07%	\$24,100		
7.38%	71	\$194,240	7.27%	\$24,070		
7.48%	72	\$188,330	7.45%	\$24,000		
7.85%	75	\$169,610	8.06%	\$23,700		
8.75%	80	\$135,480	9.63%	\$23,000		
13.62%	90	\$61,600	16.20%	\$20,050		
20.00%	95	\$28,500	25.60%	\$17,300		

private wealth quickly, it is also reasonable to assume that some of the costs faced by this population (such as health and long term care) will be shifted to federal and provincial governments – as retirees will be unable to fund these expenditures themselves. There are deep public policy implications associated with keeping the current RRIF RMD schedule intact, given current economic realities and demographic trends.

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## Concluding Recommendation: Link to Annuity Rates

I am not arguing that required withdrawals should be abolished or that they should begin at a later age, both of which would have cascading implications for the entire pension system. Rather, the primary objective of this piece is to argue that as an end result the RMD factors should be reduced by at least two to three percentage points per year. That is an immediate and necessary fix. However, another important – and rigorously justifiable – recommendation would be to link the schedule itself to life annuity payout rates. This is yet another insight from the economic lifecycle model of saving and consumption.

Here's how this would work: each year the RRIF-holder would be required to withdraw a percentage of the start-of-year value that a hypothetical life annuity would pay at that age based on the actual account value.<sup>20</sup> And, while it is beyond the scope of this article to delve into the (deep) calculus driving this result,<sup>21</sup> the *optimal and theoretical* withdrawal rates are closely linked to life annuity rates.

Operationally, and perhaps for consistency and transparency, the federal and provincial government would "bless" an industry-accepted annuity payout index – or better yet, an annuity pricing formula – as the official rate to use for determining the required withdrawals, similar to what is done for maximum allowed withdrawals from locked-in RRSPs.<sup>22</sup> Yes, these numbers would change from year to year, due to changes in interest rates and demographic factors, but that is exactly the point, to keep the RMD fair, current and economically justifiable!

# Acknowledgements

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# Appendix A

Simple RRIF's Trajectory Assuming Two Different Investment Rates							t Rates
(based on \$100,000 RRIF balance at the beginning of the year)							
		Ear	ning>	1.50%	Ear	ning>	6.50%
RRIF (%)		R	RIF (\$)	End of Year	RRIF (\$)		End of Year
Withdrawal	AGE	Withdrawal		<b>RRIF</b> Value	Withdrawal		<b>RRIF Value</b>
7.38%	71	\$	7,380	\$94,120	\$	7,380	\$99,120
7.48%	72	\$	7,040	\$88,492	\$	7,414	\$98,149
7.59%	73	\$	6,717	\$83,102	\$	7,449	\$97,079
7.71%	74	\$	6,407	\$77,942	\$	7,485	\$95,904
7.85%	75	\$	6,118	\$72,993	\$	7,528	\$94,609
7.99%	76	\$	5,832	\$68,255	\$	7,559	\$93,200
8.15%	77	\$	5,563	\$63,716	\$	7,596	\$91,662
8.33%	78	\$	5,308	\$59,364	\$	7,635	\$89,985
8.53%	79	\$	5,064	\$55,191	\$	7,676	\$88,158
8.75%	80	\$	4,829	\$51,190	\$	7,714	\$86,174
8.99%	81	\$	4,602	\$47,356	\$	7,747	\$84,029
9.27%	82	\$	4,390	\$43,676	\$	7,789	\$81,701
9.58%	83	\$	4,184	\$40,147	\$	7,827	\$79,185
9.93%	84	\$	3,987	\$36,763	\$	7,863	\$76,469
10.33%	85	\$	3,798	\$33,517	\$	7,899	\$73,540
10.79%	86	\$	3,616	\$30,403	\$	7,935	\$70,385
11.33%	87	\$	3,445	\$27,414	\$	7,975	\$66,985
11.96%	88	\$	3,279	\$24,547	\$	8,011	\$63,328
12.71%	89	\$	3,120	\$21,795	\$	8,049	\$59,395
13.62%	90	\$	2,968	\$19,153	\$	8,090	\$55,166
14.73%	91	\$	2,821	\$16,619	\$	8,126	\$50,626
16.12%	92	\$	2,679	\$14,190	\$	8,161	\$45,756
17.92%	93	\$	2,543	\$11,860	\$	8,199	\$40,531
20%	94	\$	2,372	\$9,666	\$	8,106	\$35,059
20%	95	\$	1,933	\$7,878	\$	7,012	\$30,326
20%	96	\$	1,576	\$6,420	\$	6,065	\$26,232
20%	97	\$	1,284	\$5,232	\$	5,246	\$22,691
20%	98	\$	1,046	\$4,264	\$	4,538	\$19,627
20%	99	\$	853	\$3,476	\$	3,925	\$16,978
20%	100	\$	695	\$2,833	\$	3,396	\$14,686

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## Endnotes

- <sup>1</sup> This article is an abridged version of a longer technical piece that will be published in a scholarly journal. The current "working paper" is reprinted with permission by the author and copyright is retained by the author. This article may not be excerpted, republished or cited without the written consent of the author.
- <sup>2</sup> The Overview section was prepared by the Conference for Advanced Life Underwriting (CALU) and while reviewed by the author, it does not necessarily reflect his opinions.
- <sup>3</sup> By virtue of paragraph 146(2)(b.4) of the Act.
- <sup>4</sup> The formula is set out in the definition of "minimum amount" contained in subsection 146.3(1) of the Act.
- <sup>5</sup> The term required minimum distribution (RMD) rate is borrowed from the American lexicon, as there is no comparable term in Canada, and the phrase "RRIF rate" is often confused with the investment or interest rate earned within the account.
- <sup>6</sup> This is certainly true after-taxes, see for example Mawani, Milevsky and Landzberg (2004).
- <sup>7</sup> Statistics Canada, The Canadian Population in 2011: Age and Sex, accessed 11 May 2014; http://www12. statcan.ca/census-recensement/2011/as-sa/98-311x/98-311-x2011001-eng.cfm.
- <sup>8</sup> According to the Bank of Canada, Data and Statistics Office the average interest rate offered by Chartered Banks for a 5-year fixed term was 1.5% per year in August 2013 and 6.5% per year in August 1968, the earliest year for which data is available. See *Chartered Bank Administered Interest Rates – 5 Year Personal Fixed Term*, http://www. bankofcanada.ca/wp-content/uploads/2010/09/ selected\_historical\_page47\_48.pdf, accessed 11 May 2014.

- <sup>9</sup> The Budget 1992: Budget Papers, tabled in the House of Commons by the Hon. Don Mazankowski, Minister of Finance, Feb. 25, 1992. Available at http://www.budget.gc.ca/pdfarch/1992-pap-eng.pdf pages 143-144, accessed 11 May 2014.
- <sup>10</sup> It should be noted that the current RMD rules are not monolithic. For example, in 2008, in recognition of exceptional market conditions and their potential effect on retirement income streams for retirees, the Government of Canada permitted a onetime reduction of 25% in the required minimum withdrawal for RRIF annuitants; including a taxdeductible recontribution allowance for annuitants who had already withdrawn the maximum. See http://www.cra-arc.gc.ca/whtsnw/tms/rrf-fq-eng. html, accessed 11 May 2014.
- <sup>11</sup> Without getting into the mathematical minutia of the LCM, this very brief example assumes that both the individual's subjective discount rate and market interest rates are zero, and that they only live for two periods (year one and year two).
- <sup>12</sup> Well-known Princeton University economist Angus Deaton (2005) wrote, in a memorial tribute to Franco Modigliani: "As far as I'm aware, no one has challenged the view that if people were capable of it they ought to plan their consumption, saving and retirement according to the principles enunciated by Modigliani and Brumberg."
- <sup>13</sup> In the late 1960s the economist Menahem Yaari extended the lifecycle model by focusing attention on the question of how the LCM functions in the presence of longevity risk. Yaari developed a mathematical representation of the LCM that further developed the work done by Modigliani in the 1950s and insights of Irving Fisher in the 1920s by taking longevity risk into account. Yaari described how a rational person would choose to spend their retirement both in the presence and absence of life annuities, as pensions are an important part of the retirement story. In the intervening years since





the "Yaari model" (as it has been called) was first elucidated, it has been operationalized by many financial economists – including more recently by Lachance (2012) as well as Milevsky and Huang (2011). As a result of this recent calibration work, explicit spending rates across the retirement timespan can now be obtained with computational ease. In fact, an early attempt to embed the specifics of the Canadian RRSP into the LCM is a paper by Michael Daly (1981) in the *Canadian Journal of Economics*.

- <sup>14</sup> Median income for Canadian seniors from CPP (92% of Canadian seniors received CPP income in 2011) was \$7,000, while median income from private pensions and RRSPs (63% of Canadian seniors had income from private pensions and RRSPs in 2011) was \$11,800. See Employment and Social Development Canada, *Indicators of Well-Being in Canada: Financial Security Retirement Income*; http://www4.hrsdc.gc.ca/.3ndic.1t.4r@-eng. jsp?iid=27, accessed 11 May 2014.
- <sup>15</sup> The LCM takes these assumptions as inputs, all of which can be changed and/or modified with ease. Needless to say, different inputs will change the optimal spending and withdrawal rates.
- <sup>16</sup> See the paper by Wei Sun and Anthony Webb (2013), where they compare the U.S. RMD to the so-called 4% Bengen rule for "safe" portfolio withdrawals rates in retirement.
- <sup>17</sup> On page #1088 and footnote #22.
- <sup>18</sup> See Appendix A for another comparative analysis using 1.5% vs. 6.5% rates of return and current RRIF RMDs.
- <sup>19</sup> See Office of the Chief Actuary and Office of the Superintendent of Financial Institutions Canada, *Mortality Projections for Social Security Programs in Canada*, http://www.osfi-bsif.gc.ca/Eng/oca-bac/ as-ea/Pages/mpsspc.aspx#TOC-Ic, accessed 11 May 2014.

- <sup>20</sup> Today there are in fact a number of countries (e.g. Chile, Uruguay as well as the United Kingdom, where they are called "phased withdrawals".) that have similar frameworks, in which the required withdrawal rate is a non-fixed percentage that depends on current market rates and demographic factors.
- <sup>21</sup> A closed-form mathematical expression for the optimal spending and withdrawal rate linked to annuity payout rates is available from the author upon request.
- <sup>22</sup> It is not unheard of to have a mandated withdrawal rates linked to current interest rates that are updated on a yearly basis, even in Canada. Case in point: the maximum amounts that can be withdrawn from a locked-in RRSP in the form of a Life Income Fund (LIF) are governed by provincial and federal regulation. For example, the maximum limit applicable to income to be drawn from any federally regulated LIF during 2014 is determined according to a "floating" interest rate assumption, which is currently 3.01% for the first 15 years of withdrawals and 6.00% for the years remaining to the end of the year in which the LIF owner attains 90 years of age. Source: http://www.osfi-bsif.gc.ca/Eng/ pp-rr/faq/Pages/lif-frv.aspx, accessed 25 May 2014.

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