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Annuities and their Derivatives: The Recent Canadian Experience

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Annuities and their Derivatives: The Recent Canadian Experience

Abstract

This chapter surveys recent developments within the Canadian “income annuity” marketplace. We start by computing the Money’s Worth Ratio (MWR) using a unique dataset which includes a decade of Canadian annuity payouts. We then move-on to discuss the Guaranteed Lifetime Withdrawal Benefit (GLWB) product which has recently become available in Canada. This important innovation is extremely popular and shares many characteristics with a conventional income annuity. Finally, we conclude with thoughts on the optimal product allocation within the context of the Canadian retirement portfolio.

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Comments

The published version of this Working Paper may be found in the 2011 publication: *Securing Lifelong Retirement Income*.

Securing Lifelong Retirement Income: Global Annuity Markets and Policy

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and Noriyuki Takayama

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Chapter 4

Annuities and their Derivatives: The Recent Canadian Experience

Moshe A. Milevsky and Ling-wu Shao

This chapter examines the market for income annuities, broadly defined, in the Canadian marketplace. We begin with a survey of the Canadian single premium immediate annuity (SPIA) marketplace and describe the types of SPIA products available, who sells them, and the size of the market. Next, we briefly discuss the tax motivation for buying SPIA products and how the tax treatment differs from that in the United States, a nontrivial distinction. Subsequently, we discuss the money's worth ratios (MWRs) of Canadian SPIA products, and specifically how their quoted prices reacted during the 2007/8 financial and credit crisis. We also describe the Guaranteed Lifetime Withdrawal Benefit (GLWB) product recently introduced in Canada. The product was imported from the US market (where they are known as variable annuities) and grew to a billion-dollar market within a few months. We also offer some suggestions on the optimal allocation to these products and some concluding thoughts.

The Canadian single premium immediate annuity marketplace

The Canadian SPIA market consists of up to twenty active insurance companies, most of whom operate as both life insurance and annuities providers in Canada;¹ they are a subset of the 100 or so life and health insurers licensed to operate within Canada. At any one time, only around a dozen or so of these companies tend to offer quotes on a broad range of SPIAs. Some of these companies have dropped in and out of the market over time as well as in and out of offering certain SPIA products over time. The overall size of the Canadian annuity market is sizeable, accounting for over 30 billion dollars of total premiums received in 2007 by the Canadian Life and Health insurance industry; only a fraction of these are SPIAs, that is, the income version of annuities (CLHIA 2009).

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Standard Canadian SPIA prices (as reported by CANNEX Financial Exchanges, the source of our database) are quoted in the form of a nominal monthly payment for the length of the annuity purchaser's life that is exchanged for an upfront premium payment of \$100,000. For example, on July 19, 2000, the SPIA quote by Canada Life for a 55-year-old Canadian male was \$624.96. This means that a 55-year-old Canadian male could pay Canada Life \$100,000 on that date, in exchange for receiving a continuous stream of monthly payments of \$624.96 for as long as he remains alive. This is the standard life-only annuity. Our database for the Canadian SPIA market also provides SPIA values for a wide range of guaranteed periods. Thus, a guaranteed period for a given SPIA will stipulate the number of years that the SPIA must make its stated monthly payment (perhaps to a beneficiary), even if its holder is no longer alive. Canadian SPIAs are typically quoted for ages 55–80 at five-year intervals (ages 55, 60, 65, 70, 75, and 80) and for guaranteed periods of zero to twenty-five years also at five-year intervals (0, 5, 10, 15, 20, and 25 guaranteed years). Canadian providers stopped offering SPIAs with guaranteed periods past age 90 around the middle of 2002, due to regulatory changes. We emphasize that most SPIAs currently offered and sold in Canada are in nominal terms and are not indexed to inflation, so they leave buyers exposed to inflation risk. (One can obtain real quotes, in addition to other variations like impaired annuities, on special request directly from a limited number of insurance companies.)

In general, the quoted monthly payments for SPIAs increase with age, decrease with the length of the guaranteed period, and are lower for females. For instance, a quote for a 55-year old will be in the range of \$500–600 per month, while a quote for an 80-year old will be in the range of \$800–1200 per month. The drop in monthly payments as the guaranteed period increases by five years can range from as low as a few dollars for younger ages to upward of over \$100 for older ages. The Canadian SPIA market is fairly competitive with a spread smaller than in some other markets: the spread between the highest and lowest quotes in our database is no more than 20 percent and can often at times be 5 percent.

In Canada, as in the United States and other countries, income annuities can be purchased using money from either registered (i.e., tax sheltered) retirement funds² or non-registered funds. For annuities purchased from a registered fund, where the proceeds used have not yet been subject to taxation, the annuity income is taxed as regular income and is taxable in the year that the payment is received. This is the same as in the United States, where annuity payments once received are taxed as regular current income if the annuity was purchased with funds from a qualified pension plan or IRA-funding vehicle since these are after-tax dollars.

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For annuities purchased with non-registered funds, the tax treatment depends on whether the annuity is prescribed (on a cash basis) or non-prescribed (on an accrual basis). For prescribed annuities, taxation of interest income is not subject to accrual (a larger portion of the annuity payment is counted as interest income in earlier years). Instead, the total expected interest to be earned over the life of the annuity is spread evenly over all payments and taxed by calendar year. For non-prescribed annuities, taxation of interest income is subject to accrual and the annuity purchaser is provided a tax slip for the taxable interest portion of all payments received in a policy year. This differs from the United States, where all annuities purchased with after-tax dollars are taxed based on an exclusion ratio and recovery of basis format. Under this format, the US annuity holder must subject a portion of every annuity payment once received to taxation as current income based on the exclusion ratio which is determined by the ratio of the basis (initial premium paid) of the annuity over the expected value of annuity. Once the annuity holder has recovered the entire basis for his annuity through annuity payments, any remaining payments are taxed entirely as regular income. The tax treatment of US non-qualified annuities is discussed in Brown et al. (1999), where they compute after-tax MWRs as well.

In Canada, the tax treatment for prescribed annuities is more favorable, though two main differences exist between qualifying for prescribed and non-prescribed status. To qualify for prescribed tax status, the annuity must be level (not indexed) and must be owned by the same individual who is to receive the annuity payments (this excludes corporations from being the owner of the annuity). Hence, non-prescribed status must be applied if the individual wishes to obtain an annuity with non-level payments (indexing of any kind, accelerated annuities, and/or annuities with additional medical benefit payments), or he wishes the annuity to be held in ownership by a corporation. For annuities purchased with non-registered funds, the tax treatment of annuities provides the advantage of deferred taxation on interest income. This advantage does not carry through to annuities purchased with registered or qualified funds as interest income on these funds is already subject to deferred taxation.³

Canadian money's worth ratios from 2000 to 2009

The concept of an MWR for annuities was first introduced by Friedman and Warshawsky (1988) to measure how much value an annuity provides, in relation to its cost. It is defined precisely as the expected present discounted value of the payout stream of an annuity, divided by its present-day premium cost. Mitchell et al. (1999) estimated that the MWR for US

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annuities was approximately 70–90 percent of the premiums paid, depending on the year (1985, 1990, or 1995), the yield curve applied (treasury or corporate), and whether population or annuitant mortality rates were used. While this might be seen as showing that annuities were not a good investment, since they returned on average less than similarly riskless or low-risk investments, the authors further showed that, because annuities provide insurance against longevity risk, they may still be desired by the public despite this deep discount. Higher MWRs were discovered in the United Kingdom by Murthi et al. (1999), of around 88–90 percent according to population mortality tables and around 95–97 percent according to annuitant pool mortality tables. More recent studies have concluded that annuity MWRs are often quite high, and even close to 100 percent when assessed using a risk-free yield curve, as in James and Vittas (2001) and James and Song (2002). Cannon and Tonks (2004) use a very long time series of UK annuity data from 1957–2002 and also show historical MWRs close to 100 percent. Fong (2002) and Fong et al. (2010) report that the MWR of annuities in Singapore is around 100 percent. Doyle et al. (2004) found that the MWR of annuities is close to 95 percent for both Singapore and Australia. Similarly, Gaudecker and Weber (2004), Thorburn et al. (2007), and Ruiz and Mitchell (2011) discover that MWRs are close to 100 percent for Germany and Chile.

To examine the value of SPIA products on offer in the Canadian marketplace, we calculate the MWRs for an average across annuity providers of quotes from mid-2000 to mid-2009 (see also Shao 2010). Specifically, we construct pretax MWRs using the Canadian risk-free zero-coupon government treasury yield curve provided by the Bank of Canada, together with mortality rates projected for the annuitant population by the Society of Actuaries (1996 US annuity 2000 tables with Projection Scale AA). The annuity quotes are obtained from a CANNEX annuity database which compiles private annuities quotes across Canada for annuities purchased out of registered funds.

Figure 4.1 shows the MWRs over time calculated for an average of annuity providers on annuities sold to 65-year-old males and females with no guaranteed periods. From these we can see that during most of the 2000–2009 period, the MWRs (for both sexes) were fairly stable, but during the later period – when the financial crisis of 2007/8 occurred – the MWRs spiked. The spike started around 2007 and peaked around 2008; it was coming back down as of early 2009 (the very end of the time window), although it was still significantly above pre-2007 levels. Figure 4.1 also shows that Canadian MWRs calculated using the risk-free treasury yield curve, roughly around 100–105 percent, are consistent with the more recent studies of MWR across the globe. This implies that annuity providers are either barely making any money or losing money selling annuities.

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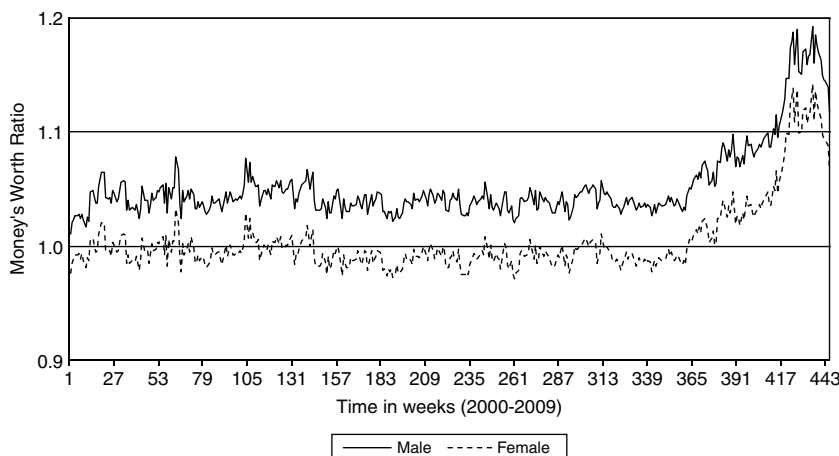


Figure 4.1 Money's worth ratio (MWR) for annuities purchased at age 65 with no guaranteed periods. *Source:* Authors' calculations; see text.

Naturally, this cannot persist for long, so it must be the case that the insurers are assuming an asset return of something greater than the risk-free rate; consequently, this implies they are investing in riskier assets than riskless government debt.

To take into account the more realistic investing behavior of annuity providers, Mitchell et al. (1999) recalculated annuity MWRs using an upward-shifted yield curve which they term the corporate yield curve. Following this methodology, we also recalculate our MWRs using a Canadian risk-free treasury curve shifted up by 178 basis points for all maturities, to account for the monthly historical bond yield difference (estimated 1952–2009) between high-grade corporate bonds (BAA corporate bonds) and riskless government bonds (ten-year US treasuries). Figure 4.2 graphs the MWRs in Figure 4.1 using this upwardly shifted treasury curve. The results show that accounting for higher yielding (but still fairly safe) high-grade corporate bond investments raises the MWRs to more believable levels of 85–90 percent (believable in the sense that annuity providers will then not lose money by selling annuities). More importantly, Figure 4.2 confirms the MWR patterns over time in Figure 4.1. Thus, during most of 2000–2009, the MWRs are fairly stable but then they spike up dramatically during the crisis of 2007–8, with the spike starting around 2007, peaking around 2008. Again, it comes back down as of early 2009, albeit not back to pre-2007 levels.

The spiking of the MWR during the financial crisis of 2007–8 is a result of the fact that annuity providers did not adjust their annuity quotes, on

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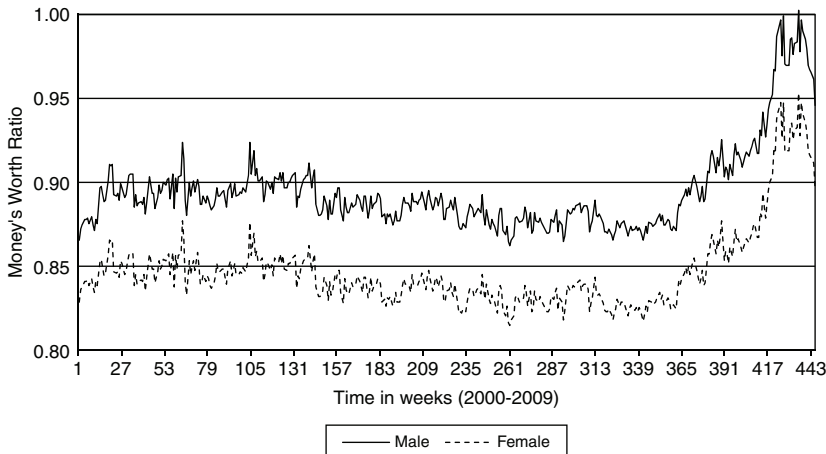


Figure 4.2 Adjusted money's worth ratio (MWR) for annuities purchased at age 65 with no guaranteed periods. *Source:* Authors' calculations; see text.

average, to compensate for the dramatic downward movement in the risk-free zero-coupon yield curve. This occurred during the 2007–8 financial crisis, during which the Canadian government lowered interest rates to combat the aftereffects of the crisis. A closer look at the individual annuity quotes offered by companies from 2000 to 2009 suggests that, while annuity providers did downwardly adjust annuity quotes over time to compensate in part for improvements in mortality over time, annuity quotes stayed surprisingly flat during the 2007–9 time window despite the fact that the interest rate environment changed dramatically. This revelation suggests that either the funding vehicles used by the SPIA providers were not very sensitive to changes in the risk-free yield curve or that the annuity industry by and large ignored the fallout from the 2007–8 financial crisis. In other words, if the Canadian SPIA industry is not basing long-term asset returns on the risk-free yield curve, it runs the danger of underfunding like many pension funds around the world.

To sum up thus far, there are two main takeaways from our analysis of the Canadian SPIA market. First, the MWRs of Canadian SPIAs represent a fairly good deal for the annuity purchaser. Should the annuity purchaser believe that his annuity payments are indeed risk-free, the SPIA with an MWR of around 100 percent (when evaluated with the risk-free government treasury yield curve) represents a very competitive investment compared to similar risk-free government bonds. Second, the MWRs' patterns for Canadian SPIAs over the 2007–8 financial crisis are a worrying sign of

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the future health of Canadian SPIA providers, in that it suggests annuity providers could be facing significant risk of underfunding their liabilities.

The introduction of the guaranteed lifetime withdrawal benefit product in Canada

The Guaranteed Lifetime Withdrawal Benefit (GLWB) annuity was introduced to Canada in late 2007 by Manulife Financial (the parent company of John Hancock in the United States), which at the time was the largest insurance company in Canada based on market capitalization. The initial GLWB product was modeled on the variable annuity (VA) design in the United States. VAs in the United States were initially marketed and promoted for the favorable tax treatment and death-guarantees they enjoyed. Over time, these products moved to include riders with features of minimum income stream investors could receive, and these features became critical selling points on their own.

Essentially, a GLWB rider allows investors to lock in a minimal income for life – like a SPIA or deferred income annuity – without tying up or surrendering their capital irreversibly (Milevsky and Salisbury 2006). Thus, they provide savers with (some of) the retirement longevity protection of a traditional annuity, without forcing them to surrender upside potential or liquidity. The best way to think of them is as a mutual fund with a complex path-dependent put option that allows for a minimal withdrawal. Obviously, the guaranteed withdrawal level is (much) less than what a SPIA would have offered, otherwise there would be blatant arbitrage opportunities for individuals.

Here is a synopsis of the mechanics. The individual policyholder (in the pure case, a pensionless retiree) deposits or rolls over a sum of money into an investment portfolio which is then allocated (usually by the individual) into a number of subaccounts that contain stocks, bonds, and other generic investments. The portfolio then grows (or shrinks) over time, depending on the performance of the underlying investments. Any capital gains are tax-deferred and eventually treated as ordinary income (note that in Canada there is no tax deferral of gains). Then, at some future date, usually under the control of the policyholder, the annuitant can start taking guaranteed withdrawals from the account. We think of this income like a systematic withdrawal plan (SWiP) at a nominal (i.e., not inflation-adjusted) nondecreasing level. The income is guaranteed to never decline for the remaining life of the annuitant (and his spouse in the case of a joint product). Thus, in contrast to a SWiP, if the underlying investment portfolio (a.k.a. account value) ever reached zero, the guaranteed income would continue, as long as one member of the couple lives.

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The guaranteed withdrawal rate is determined by the company issuing the GLWB at the time of sale. The guarantee *amount* is the product of multiplying a guaranteed *rate* by the guaranteed *base*, determined at the point of first withdrawal. In the case of the current offering of Canadian products, the rate is between 4 and 6 percent, depending on the age at initial withdrawal. Moreover, if the investment portfolio happens to grow even while undergoing these withdrawals, the guaranteed base might reset to a higher level and hence generate even greater withdrawals. As far as estate values are concerned, upon the second death, whatever is left over in the account goes to the heirs, with the requisite tax implications (and depending on whether the GLWB was inside a tax shelter).

GLWBs as described earlier exist in a variety of alternative formats, and they are often bundled with an array of other guarantees, ratchets, or step-ups linked to death benefits and life insurance. But specifics aside, the basic GLWB guarantees that some withdrawals will continue for life, regardless of whether the underlying account has the funds to support them. In other words, fees and periodic withdrawals are deducted from the VA account, as long as there are funds available. But if those periodic withdrawals ever fully deplete this account, the underwriter steps in and pays for the remaining withdrawals over the lifetime of the investor. Thus, it will convert into a pure income annuity or SPIA if the account is ever depleted.

The periodic withdrawals provide downside protection, but there is still upside potential for the underlying account to grow if markets perform well. The investor preserves liquidity, since the underlying account value may be withdrawn at any time (less any surrender charges). Unlike a traditional income annuity, if the investor dies, his or her heirs will inherit the remaining account value.

As of early 2010, the large majority of these sales in Canada (also known as segregated funds) now include GLWB riders, which anecdotally have become central to the sales pitch and a key reason that consumers purchase this product. To the insurance companies manufacturing the new generation of VAs, these are viewed as a private sector replacement for defined benefit pensions, in an increasingly defined contribution world. Whether or not the GLWB is better than SPIAs from the consumer's perspective depends on the relationship between the pricing of the guarantee, the retiree's optimal consumption strategy, and the existence of bequest motives. Below, we make the case that it is often optimal to devote some retirement wealth to these instruments.

In sum, the latest generation of (what used to be expensive tax-deferred) VA contracts has been financially engineered to provide an assortment of lifetime income guarantees intended to protect the policyholder against what the industry has coined the 'sequence of returns risk' and 'longevity risk'. These refer to the chance that a retirement portfolio from which cash

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is being withdrawn suffers early losses and the retiree lives longer than average. The common denominator of all these insurance riders is that they contain an implicit put option on financial markets, plus some form of longevity insurance akin to a pure life annuity. Of course, using the concept of the put–call parity, these can also be viewed as call options to annuitize at some variable strike price. The (anecdotal) sales ‘pitch’ for these products revolves around the idea that these guarantees should induce investors to take on more financial risk than they normally would if they did not have these guarantees. Evidence of this is provided by Milevsky and Kyrchencko (2008).

The longevity-put can be selected (or not) when the VA policy is initially purchased. This rider gives the holder the ability to annuitize some minimally guaranteed amount at some contractually guaranteed rate. Thus, for example, if a \$10,000 premium is placed into a VA, the insurance company might guarantee that at least \$15,000 can be received for life, starting in ten years. The purchase price (or annuity factor) would be specified within the contract; for example, \$20 per dollar of lifetime income. So, essentially, this contract would guarantee a life annuity of at least $\$15,000/\$20 = \$750$ per year in the worst-case scenario. And, if the market value of the (subaccounts within the) VA is worth more than guaranteed \$15,000 in ten years time, the policyholder can withdraw at the (greater) market value. As of mid-2009, several companies offer GLWB products in Canada including Empire Life, Desjardins Financial, Industrial Alliance, Manulife Financial, SunLife Finance, and Canada Life. Table 4.1 provides a table illustrating the most important dimensions along which GLWB products can differ from each other.

As noted earlier, questions then arise regarding how much of his wealth the consumer should optimally allocate to these products. For instance, how much of the retiree’s nest egg should be invested in an annuity product versus regular mutual funds? What proportion, if any, of a portfolio should be allocated to a VA with a GLWB? Or what if the consumer seeks to figure out at what age she should purchase an annuity or begin lifetime income on an existing VA product? These are definitely not portfolio asset allocation questions, but rather they are what we term product allocation issues which have not received sufficient attention from academics and practitioners to date. For this reason, it may be useful to explore the product allocation aspects of retirement income planning, as they pertain to the allocation between basic SPIA products and GLWBs.

We think of this issue as an optimization problem along a frontier that is defined by the trade-off between sustainability and bequest, and review the products to generate income during retirement that are available for client portfolios. Conceptually one can group the entire universe of retirement income-generating products into three distinct ‘silos’. In the first silo, we place traditional mutual funds, exchange traded funds (ETFs), separately

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TABLE 4.1 Typical guaranteed lifetime withdrawal benefit (GLWB) product features

Product feature	Options
Minimum single premium initial deposit	Ranges from \$5,000 to \$100,000
Investment asset allocation options	Complete flexibility to select any funds or restricted model portfolios
Highest allowable equity/risk exposure	Ranges from 50 to 95%
Total maximum (investment + insurance) fees	Anywhere from 1 to 5%
Phantom interest credit to guaranteed base	Ranges from 0 to 10%
Earliest timing of guaranteed withdrawals	Immediately to ten years
Guaranteed early withdrawal rate at age 62	Ranges from 4 to 6%
Guaranteed late withdrawal rate at age 77	Ranges from 5 to 8%
Frequency of guaranteed base value reset	Annual, quarterly, monthly, daily
Ability to increase withdrawal rate with age	Some products offer increasing bands
Inflation or COLA for guaranteed income	Most do not
Credit strength of entity issuing guarantee	Anywhere from A to AAA

Note: Some products imposed a surrender charge on excess withdrawals.

Source: Authors' calculations; see text.

managed accounts, and other conventional accumulation-based instruments. They contain no bells, no whistles, and no guarantees. From these, retirement income is generated by periodically selling an appropriate number of units; one can think of this as reverse dollar cost averaging (DCA), otherwise known as a SWiP. There is no longevity insurance or downside protection.

A second set of products include defined benefit pensions and income annuity products, including variable, fixed, and inflation-adjusted payments that offer a lifetime income at a very cheap economic price. In this silo, too, there are no bells or whistles, but high mortality credits come at the cost of complete irreversibility and loss of liquidity. We label anything in this silo a lifetime payout income annuity (LPiA). This is the traditional longevity insurance addressed in many research articles. And in the third silo, we place all of the remaining financially engineered products that are not-quite-pensions and not-quite-SWiPs. These are the protected investments and longevity-put options, including, of course, VAs with GLWB.

Consider the case of a retiree, aged 65 and in good health, who wants to start withdrawing (say) 4.5 percent of the current value of her portfolio, inflation-adjusted each year, to generate income for the rest of her life. We assume she has no preexisting income from a pension (and ignore social security for the moment), nor does she intend to borrow against home equity using a reverse mortgage. The \$4,500 desired per \$100,000 initial

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nest egg is a reasonable spending rate according to most sustainability studies. From a strategic point of view – balancing the desire for bequest versus personal income sustainability – one can make an argument that approximately one-third of her investable nest egg should be allocated to pure pensions (i.e., she should use a third of her money to buy a SPIA), one-third to conventional mutual funds and/or managed accounts (i.e., she should keep things as is), and the final third to protected investments (e.g., VAs with a GLWB). As we show elsewhere, this particular allocation produces an optimized balance between the goals of personal retirement income sustainability and leaving a financial legacy for the client's descendants. More technically, this allocation will induce the most efficient 85 percent income sustainability ratio while still maintaining a 20 percent financial legacy in present value terms. We must add that this hypothetical model client was assumed to have no preexisting pension, whereas in the real world, one must add the discounted value of pension and social security benefits to arrive at a mark-to-market 'value' of the retirement nest egg. If only one-third of this broadly defined nest egg should be annuitized, and the discounted value of her social security benefits is more than twice her liquid investable net worth at retirement, she already has all the annuitized income she needs.⁴

The approximately one-third of the client's portfolio allocated to GLWB-type products will swing like a pendulum between the pure SPIA and the pure investment silos depending on market conditions. When times are good, the pendulum behaves like a mutual fund and increases in value during bull markets. Of course, it never quite catches up to the traditional investment silo because of the higher fees and insurance costs. When times are bad and markets are falling, the pendulum swings in the other direction and behaves more like a SPIA or pure pension. Anyone who purchased a GLWB in late 2007 will understand firsthand how this process has worked. The GLWB has converted into a traditional income annuity, which pays a percentage of the base for the life of the annuitant. The bear market essentially 'pensionized' the VA of segregated funds.

Conclusion

Our overview of the available retirement income products in Canada has focused most on single-premium immediate annuities as well as GLWB products, which are options (or derivatives) on life annuities. We find that the money's worth values in Canada do not differ substantially from those reported in other countries, although our MWRs are marginally higher and exhibit a guarantee-dependent relationship that remains unexplained. We also note a large spike in MWR values around the financial crisis of

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2007–8 during which the values exceeded one by substantial margins; buyers of SPIAs during the financial crisis received a surprisingly high MWR, probably because the crediting (pricing) rate used by insurance companies was tied to long-term and slower moving yields on their corporate and commercial bonds portfolio. We also evaluate how much a retiree might optimally allocate to GLWB and discuss sensible product allocation, where the retiree spreads her assets across conventional (low-cost) mutual funds, income annuities, and GLWB products, with the exact allocation depending on the individual preference for bequest versus personal consumption. The development of these products suggests that the Canadian market for annuities will continue to grow in size and innovativeness.

Notes

- ¹ These companies have included AIG Life of Canada (now BMO Life), Canada Life, Clarica, Desjardins Financial Security, Empire Life, Equitable Life, Great-West Life, IAPacific Life, Imperial Life, Industrial Alliance, London Life, Manulife Investments, Maritime Life, NN Life, North West Life, Royal & Sun Alliance, SSQ Financial Group, Standard Life, Sun Life Assurance Co., and Transamerica Life.
- ² These include Registered Retirement Saving Plans or RRSPs, Locked-in RRSPs, Registered Retirement Income Funds or RRIFs, Locked-In Retirement Funds or LRIFs, Life Income Funds or LIFs, or pension funds.
- ³ Interested readers should consult Charupat and Milevsky(2001) for a discussion of how the favorable Canadian tax treatment of income annuities compares to that in the United States, along with the apparent tax arbitrage opportunity this creates using a formal pricing model.
- ⁴ Naturally, the ‘one-third thrice’ model allocation depends on a number of assumptions, both implicit and explicit. For example, to generate these values, we assume a GLWB guarantees income of 5 percent for life at an extra (above management fee) cost of seventy-five basis points per year. If a specific GLWB charged more or promised less, the optimal allocation would be below one-third. In addition, if the retiree sought greater sustainability than (in this example) 85 percent, then she would annuitize more. If she wanted to leave a larger financial legacy, then she would annuitize less.

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