

Research and Reality - A Literature Review on Drawing Down Retirement Financial Savings.

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Abstract

How DO, COULD, and SHOULD retirees draw down their financial savings? This paper reviews over one hundred papers on this topic from the perspective of individuals, families, governments and financial institutions. Three significant conceptual/methodological weaknesses in the existing literature are identified: (1) analysts have examined a limited range of self-managed drawdown strategies; (2) nearly all have ignored home ownership, pensions, debt, and government taxes and transfers when quantitatively evaluating alternative drawdown strategies and (3) there is a well-acknowledged gap between the behavior implied by economic models and that of real-life individuals, particularly when it comes to voluntary annuitization. Expanding the set of drawdown strategies evaluated (e.g. including larger payouts when life expectancy is reduced after the onset of a significant health condition, or using savings as bridge income to delay the take-up of Social Security payments), refining the income concept used, and more exact modeling of the trade-offs underlying individual decision-making will likely increase the appeal of self-managed drawdown strategies and help resolve the “annuity puzzle” that has long dominated this line of research. It may also lead to advice and financial products that will better meet the needs of retirees.

Introduction

The study of retirement savings drawdown has exploded in recent years owing to the international growth of individual accounts in all three spheres of retirement savings – personal, employer and state – as well as the aging of populations in developed countries and the consequential greater focus on retirement-related topics. This area of interest has not only grown in magnitude, but has also developed in dimension as different disciplines engage in its study from different angles. For example, the interest of a financial mathematician might be the best retirement investment strategy; economists study optimal retirement wealth drawdown given an individual’s preferences; the interests of actuaries working in the insurance industry lie in the design and marketing of annuity contracts, and a public policy analyst might examine the effect of government policies on drawdown behavior. The objective of this paper is to review the existing literature on this multi-faceted topic in order to gain clear insight into the drawing down of individual retirement savings from both the individual’s perspective as well as from that of other stakeholders, such as the individual’s family, government and financial institutions.

In 2003, the Congressional Research Service reported that 84.8% of American workers aged 21 and older who participated in an employer retirement plan will be offered a lump sum at retirement (Purcell, 2005). There are two explanations behind the growth in lump sum distributions: (1) defined benefit (DB) pension plans are declining and those remaining are increasingly providing a lump sum benefit (for example, from cash balance plans) or a lump sum option; and (2) defined contribution (DC) pension plans are on the rise, and the vast majority do not offer their members an annuity option (Brown and Warshawsky, 2001). There are various advantages of choosing a lump sum: having access to liquid funds enables the retiree to meet unforeseen expenses, reduce debt, participate in (and benefit from) a strong financial market, and design an income stream that best fits a retiree’s changing needs (among other advantages that we discuss throughout this paper). The primary drawback of lump sum distributions is the risk that the retiree will outlive this source of income. In addition, the management of post-retirement financial risks becomes the full responsibility of a worker who chooses a lump sum as he or she now bears the risk of high inflation, poor investment performance, consuming overly conservatively and thus living an unnecessarily reduced lifestyle, as well as other risks that we discuss in

this paper. With the trend towards earlier retirement and continuing mortality improvements¹, a retiree should anticipate needing to balance the risks underlying liquid wealth over the span of potentially 40 years of retirement. As a person ages, he or she will likely become less and less able to manage these risks and avoid being misled by unscrupulous advisors. Many of these risks are assumed by, or shared with, the plan sponsor under the traditional defined benefit payout. Unlike a plan sponsor, individual retirees have much shorter time frames, less capacity to pool their risks, and no economies of scale.

In the drawdown of retirement savings, the interests of the various stakeholders are not necessarily in parallel. For instance, in countries where income-tested social transfers for seniors are significant, it could be in the best interest of low-income retirees to draw down their wealth during the earlier years of retirement when they are better able to enjoy it, and benefit from greater transfers thereafter. On the other hand, a rise in poverty rates and financial pressure on income-tested social programs would lead to changes in intergenerational transfers within the economy and affect the financial welfare of the following generation (Brown and Warshawsky, 2001). This paper considers the perspectives, and potentially conflicting objectives, of the various major stakeholders affected by strategies, including the retiring individuals, family, heirs, the financial industry, and the government sector.

Despite the relatively recent surge in the topic of drawing down retirement savings in academic circles, it has not penetrated the retirement planning process. A major Canadian financial newsletter recently noted that “retirement income products still look very much the same as they did twenty years ago”² at the same time that “retiring plan members are likely faced with the most important financial decisions of their lives in how to use their savings...” (Côté, 2010, pg. 1).

The level of attention paid to retirement savings drawdown has been small relative to the emphasis that employers, policymakers, consulting professionals, financial advisors and academics have placed on the accumulation of retirement wealth. A recent example is the final report of the Canadian government’s recent Task Force on Financial Security (Government of Canada, 2010), which made relatively little mention of the decisions associated with spending down retirement assets but rather mainly discussed the need for seniors to have saved, the level of savings acquired, the need for seniors to claim their government benefit entitlements, the heightened susceptibility of seniors to frauds and scams, and the difficulty that seniors may have in accessing financial institutions.

A “comprehensive retirement planning strategy requires that one think about more than how to save: it also requires thinking about how to spend” (Brown, 2009a, pg. 178). A poorly chosen drawdown strategy can negate the potential rewards from diligent efforts on the accumulation side. Recent academic research on drawdown has been relatively significant compared to twenty years ago, but clear, unambiguous, and disinterested guidance on how best to draw down individual retirement accounts and manage the large associated risks has not been widely disseminated. In large part, individuals have been left to decipher conflicting and potentially self-serving advice from financial advisors, or to follow social norms that may or may not fit their personal circumstances and objectives.

Researchers have generally approached the choice among drawdown strategies by determining the optimal strategy through maximizing an objective function (such as the expected discounted utility), or

¹ See Brown (2008) for a summary of studies reporting the mortality improvements and declines in labor force participation at older ages for OECD countries.

² This is aside from “Guaranteed Withdrawal Minimum Benefit Products” (see Appendix A), which are limited in Canada.

applying risk measures to ascertain the tradeoff between the consumption, security, and bequests generated among alternative strategies. As we explain throughout this paper, however, researchers are increasingly recognizing that individual preferences are not easily captured in simple models, since many important considerations are more difficult to measure quantitatively than others. These include the desire for flexibility in annual payments, the aversion to loss of control over one's assets, the concern for unforeseeable financial needs (such as those associated with health), the pleasure/headache of managing an investment and drawdown strategy, the ease of budgeting when income is known in advance, the timing of consumption relative to declining health, the possible stigma of receiving income-tested government benefits, the forms of other retirement financial resources (such as an owned home, having a spouse with resources, supportive children, or a large defined benefit pension), tax implications, etc. Further, a retiree's objectives likely change over time. The topic of drawdown is, consequently, dynamic and poses an ongoing challenge to researchers, to financial advisers, and to retirees themselves.

This paper is broadly divided into three sections: "How DO Retirees Draw Down their Financial Savings?", "How COULD Retirees Draw Down their Financial Savings?", and "How SHOULD Retirees Draw Down their Financial Savings Given an Unknowable Future?". The first section reviews the literature on the drawdown behavior of current retirees. The second section describes the conventionally examined drawdown strategies, including their advantages and disadvantages. We organize our discussion of these drawdown strategies into three main categories: (1) annuitization of wealth³, (2) self-managed drawdowns⁴, and (3) hybrid strategies that combine elements from the first two categories. The final section begins by explaining the research methodologies of past studies that have been employed to determine how seniors "should" draw down their assets, which is followed by a discussion on the potential methodological weaknesses. This section then consolidates the relevant findings of previous literature to provide insight into this question from the perspective of the various stakeholders, finishing with the retirees themselves.

Although we intend to provide an international perspective, most of the literature reviewed in this paper is from Canada and the U.S. and naturally regards the issue from the perspective of these two countries. We generally limit the cited literature to the last ten years.

How DO Retirees Draw Down their Financial Savings?

The first cohort with substantial amounts of unannuitized pension wealth is only now entering retirement. Little is known about the strategies they are using to manage the decumulation of that wealth (Webb, 2009, pg. 14).

³ Literature on the topic of retirement savings drawdown generally only considers nominal annuities (that is, a single premium immediate nominal annuity). The likely explanation for this concentration is that the majority of the literature is by American researchers, and most privately available payout annuity products in the U.S. market are fixed in nominal dollars (Brown, 2009a). Consequently, the term "annuity" in this paper refers to this type unless otherwise stated.

⁴ This term is also known as a "phased withdrawal strategy", "self-insure", or, when the payments replicate those from a life annuity, "self-annuitization". This paper uses the term "self-managed drawdown strategy".

Very few studies have reported on the historical behavior of retirement wealth drawdown strategies, owing simply to the nature of the publicly available survey data - it reports on actions rather than the underlying adopted strategies driving those actions (Webb, 2009). Two points are, however, certain. First, there is a high degree of aversion to voluntary annuitization among retirees^{5, 6, 7}. During his Nobel Prize acceptance speech on December 9th, 1985, Franco Modigliani said "It is a well known fact that annuity contracts, other than in the form of group insurance through pension systems, are extremely rare. Why this should be so is a subject of considerable current interest. It is still ill understood. Adverse selection, causing an unfavorable payout, and the fact that some utility may be derived from bequest are, presumably, an important part of the answer". The second known fact concerning drawdown behavior is that retirees generally draw on their savings at a very conservative rate (De Nardi et al., 2006; Love et al., 2008; Smith et al., 2009, Poterba et al., 2011a). For instance, examining changes from 1998 to 2006 in asset holdings of persons at least 60 years old from the Health and Retirement Survey, Smith et al. (2009) found that individuals were very slow in spending down their retirement savings. In fact, up to approximately age 85, those in the top income quintile accumulated wealth!

Some organizations have taken the initiative to investigate the question of actions versus strategies by developing their own surveys. The rest of this section will summarize findings from some of these surveys.

The first example is Watson Wyatt's "2007 U.S. Surveys of Older Employees' and Retirees' Attitudes Toward Lump Sum and Annuity Distributions From Retirement Plans" (Warshawsky and Hill, 2008). The response from 5,000 respondents across the U.S. (2,600 older employees and 2,400 retirees) indicated that annuities, despite their protection against longevity and financial risk, are not popular among retirees. Of the respondents with DC plans only, 130 were employed and 499 were retired. The remaining respondents had either only a DB plan or both. A mere 6.5% of workers with only DC pension plans intended to receive at least some benefit as an annuity. Among individuals with only DC plans who recently retired, the proportion was slightly higher at 12.1%. The survey also investigated the underlying attitudes by asking a series of hypothetical questions (i.e.: "which would you prefer - annuity and/or lump-sum?"). They found that the majority of employees opted for a combination of an annuity and a lump-sum (although disproportionately increasing either the annuity income or the size of the lump-sum could persuade the majority of the respondents to select one over the other). They also found that personal characteristics played an important role (e.g., older, single women without a college degree were more likely to prefer annuities) and that annuities were popular among persons who deemed themselves healthy and those who appeared more risk-averse.

Previous to the 2007 survey, Watson Wyatt had conducted a similar survey in the UK to explore attitudes on annuitization (Gardner and Wadsworth, 2004). At that time in the UK, mandatory annuitization was in effect and it was the largest annuity market in the world. Relative to the U.S. survey, the support for annuitization was even poorer. For instance, over half of the sample would never voluntarily annuitize, even partially, if given the choice. This aversion stemmed from distrust of financial institutions and a dislike for the loss of control over financial assets.

⁵ For empirical evidence of the low rates of voluntary annuitization, see Milevsky and Young (2007) and Brown (2009a) for the U.S. experience, and James and Song (2001) for an international perspective.

⁶ See Appendix A for a list and description of the major types of annuity products.

⁷ Section "How COULD" reviews the disadvantages of annuitization that could explain this aversion.

The Society of Actuaries (SOA) and LIMRA ran six focus groups comprised of current retirees in the U.S., with substantial self-managed financial assets, to investigate their approach to consumption and investing during retirement (Greenwald et al., 2006). This qualitative study suggested that current retirees are not equipped to face the unknown risks that retirement brings – including inflation, health care costs, home care expenses, investment risk, maintaining lifestyle, and outliving assets. The overarching observation was that, rather than depend on sound financial long-term planning, retirees exhibited shortsighted views and an overreliance on their intuition when it came to adjusting their consumption or investment strategies. They failed to realize that such an attitude could work for a non-elder, whose youth and working status allows them to be more flexible and adjust to different financial setbacks. As the frailty of old age begins to set in, the authors explained, returning to work ceases to be an option and medical needs cannot be postponed. Further, the major expenditures for a working adult and those for an elder are generally quite different. For instance, the cost of education and purchasing a home are self-initiated and foreseeable, while the onset of a health condition or the death of a spouse can be sudden and the associated costs unpredictable. Although the focus groups were well aware of the high financial expense associated with declining health, they had not taken pro-active steps to protect themselves, but rather felt that any long-term risks could be dealt with by adjusting their spending as needed. They further did not fully appreciate the corrosive effect of inflation, investment risk, the risk of long life, nor the financial consequences of the death of a spouse or other adverse circumstances. In particular, they did not value annuities or long-term care insurance, the former being viewed as a retirement vehicle for the financially illiterate and the latter being too expensive. Lastly, none of the respondents had a systematic drawdown strategy or a long-range financial plan, but were proceeding on an ‘as needed’ basis, except for the very few who were convinced to annuitize their income by their financial advisor.

In phase II of their study, the SOA, LIMRA and InFre (Bryck et al., 2009a) further investigated the issue using a broad-based survey, which was conducted in February 2008. The 1,500 respondents revealed that most retirees were confident in their level of accumulated savings and their investment planning - many had formal or informal plans for managing their finances. On the other hand, 20% of retirees did not have a plan and many were poorly informed about financial issues and were not getting help in minimizing risks. A follow-up survey was conducted after the financial downturn in 2009 (Bryck et al., 2009b). This study unsurprisingly revealed that retirees felt less secure after the financial crisis, less confident that they have saved enough for retirement, less willing to take risk, and that they were trying to control spending. Also, there had been an increase in the number of retirees who had consulted financial advisors. In 2011, Bryck et al. (2011) investigated the long-term effects of the 2008 financial crisis by again surveying the same respondents from the previous two studies. They found that they continued to express some of the behavior found in the 2009 post-financial crisis survey – such as more conservative spending patterns and the continued use of financial advisors. In all three surveys, there was little interest in annuitization, even among retirees whose guaranteed income from Social Security and/or employer DB plans was not sufficient to cover basic living expenses (approximately 30%). Despite the financial crisis, there did not appear to be a change in retirement planning - in all three surveys, for example, approximately a third consistently had not considered how long they expected their money to last in retirement.

Brown et al. (2008) is a last example of a study that attempted to reconcile the void in available data by conducting its own survey. This study explored various hypotheses to explain the near absence of voluntary annuitization, and we discuss the findings in Section “How COULD”.

Many of the above cited surveys have concluded, with considerable supporting evidence, that retirees and prospective retirees are not sufficiently financially literate, and are under-appreciative of the value

of annuities and of financial advisers. It should be noted that many of the professions and institutions behind the surveys, as well as many of the studies referenced throughout this paper, had an interest in promoting annuities, and naturally the designs of the studies sought mainly to uncover the reasons behind the lack of voluntary annuitization, rather than investigate potentially bigger questions relating to the drawdown of retirement wealth such as the relationship between financial literacy, the choice of drawdown strategy, and life satisfaction.

How COULD Retirees Draw Down their Financial Savings?

The retirement savings drawdown choice can be broadly grouped into three categories:

- the purchase of an annuity, where the retiree converts his/her wealth into a guaranteed income stream while alive through either a plan sponsor or directly from an insurance company;
- the discretionary management of retirement wealth, where the retiree controls his/her investment strategy and the level and frequency of the withdrawals (subject to any rules and regulations mandated by the state) - we refer to this as “self-managed drawdown”;
- hybrid strategies that combine the purchase of annuities with self-managed wealth.

We next examine the advantages and disadvantages of each of these strategies, beginning with annuitization, then moving onto self-managed strategies, and lastly hybrid approaches (where we also include annuity products with hybrid properties).

Annuitization

Rates of voluntary annuitization are extremely low, and most households appear to exhibit a high degree of annuity aversion (Webb, 2009).

Annuities offer security and a sustained income by converting wealth into a guaranteed stream of income for the lifetime of the recipient. They serve as protection against the risk of longevity, investment, and possibly inflation (if the annuity is inflation-protected). These features are quite attractive to retirees given the 2008 turbulence in the financial markets, and the ongoing increases in life expectancies. Annuitants also benefit from mortality risk pooling; that is, those who live will profit from the invested capital of those who die. This extra return is called the “mortality premium” (also known as the mortality creditor bonus)⁸. Consequently, a surviving annuitant’s total annual return equals the rate of interest at the time of purchase plus a mortality premium (less any transactions costs). This additional return increases steeply with age owing to the increasing probability of death. For instance, if the probability of death at age 95 is 20% and the underlying interest rate is 5%, then those who survive to 96 would earn an additional 26.25% on their wealth ($1.05/[1-0.8] - 1.05$) (Milevsky, 2002). As a result, whole life annuities typically yield a higher return for survivors than investments such as CDs, bonds, and money market funds (Babbel, 2008).

Another benefit of annuitization is that the stable, foreseeable income stream facilitates financial

⁸ For instance, if wealth W is invested in a bond with a rate of return of R , then it will grow to $W(1+R)$ after one period. If the same wealth were instead used to purchase an actuarially fair life annuity, it would grow to $W(1+R)/(1-q)$ if the consumer survives (where q is the probability of death in that one year period) (Brown et al., 2008).

planning and budgeting. By guaranteeing a stable source of income that would cover their basic necessities, individuals can feel more at liberty with their remaining wealth to, for example, give to charity, bequest to heirs, and/or invest more aggressively where the returns are likely to be higher than a conservative investment⁹. A stable income stream could also ease the mind of individuals prone to worry by allowing them to be less preoccupied with the status of any self-managed wealth, such as its financial performance and its ability to sustain them until their unknown death. The aged would, in particular, perhaps find the responsibility of managing their wealth more and more burdensome with time. Annuitization can also help workers decide when to retire since “(i)f a household can calculate a current income level that would provide an adequate lifestyle, a check of annuity prices can establish whether existing wealth is sufficient to assure this lifestyle or whether retirement should be postponed” (Benartzi et al., 2011, pg. 147).

Because of these benefits, economic literature has nearly unanimously agreed that, at least from a “pre-tax and savings-only” perspective¹⁰, annuitizing a substantial portion of wealth would enhance the financial welfare of most retirees. The lack of demand in the private annuity market has given rise to a large body of research that attempts to understand the aversion of individuals to annuitization. This research has generally worked from a rational framework, although more recent literature has begun to move beyond the rational paradigm into possible behavioral biases (Brown, 2009a). The following is a comprehensive list that sub-divides the proposed explanations behind the near absence of voluntary annuitization into three categories – (1) rational decision arising from personal preferences and circumstances, (2) rational decision arising from environmental limitations, and (3) behavioral biases. Section “How SHOULD” presents solutions to some of the drawbacks of annuitization.

(1) Rational decision arising from personal preferences and circumstances:

(a) *Loss in liquidity*: Annuitization is a non-reversible decision – that is, individuals cannot cancel an annuity agreement and recover the principal regardless of their financial needs. Consequently, the choice to annuitize produces a loss in liquidity since annuitants can only access the specified level of income in each period. With age, there is an understandable fear of losing control of one’s financial assets given the risk of large and irregular uninsurable expenses. Without access to a pool of capital, an annuitant could have to borrow at unfavorable rates to meet unanticipated expenses, e.g., to construct a wheelchair ramp to continue living in the same home. A still more unfavorable outcome would be severe cuts to consumption if the annuitant is unable to find a lender, and is obliged to fund the expense out of the fixed annuity income.

(b) *Loss of bequest*: Annuitized wealth cannot be left as a bequest. Even if the annuitant’s death is relatively early, the remaining premium is, by design, used to subsidize the other annuitants in the pool and no money is returned to the annuitant’s heirs. When an annuity is purchased, the consumer is essentially trading the bequest potential of his/her financial wealth for a mortality premium and longevity insurance.

⁹ Ameriks et al. (2001) showed that a life annuity could allow a risk-averse individual to invest remaining, non-annuitized, wealth more aggressively since the annuity’s guaranteed income stream would substitute for the conservative assets in the portfolio – such as cash or bonds. See Section “How Could” under “Hybrid Strategies” for more discussion.

¹⁰ The vast majority of past published studies have evaluated alternative drawdown strategies by measuring the pre-tax income obtainable from retirement savings alone - see Section “How SHOULD” under “Discussion on Research Methodologies”.

(c) *Benefit to delay*: The steeply increasing “mortality premium” as described earlier creates more advantageous annuity pricing as the retiree ages. Consequently, another explanation behind the small annuity market is that households defer annuitization to a later age to obtain a better price. (See Section “How Could” under “Hybrid Strategies” for a discussion on delaying annuitization.)

(d) *Low risk aversion*¹¹: An annuity guarantees a stable income stream for the lifetime of the recipient. If a retiree has a high level of risk tolerance, and is therefore more willing to accept a volatile income stream, then s/he would place less value on the stability offered by an annuity (the reverse is also true). Numerous studies have ascertained that risk preference has an impact on the optimal level of annuitization – that is, the higher the appetite for risk, the less attractive annuities become (examples include Blake et al., 2003; Babbel and Merrill, 2006; Horneff et al., 2008; Milevsky and Young, 2007).

The desirability of smooth income inflows is obviously relevant in the comparison of drawdown strategies, but its importance should be considered in light of the considerable year over year variations in earnings that future retirees routinely experience during their working lives. Morrison (2000) found that the standard deviation of annual real earnings, divided by the level of those earnings, exceeded 40% for more than half of a large representative sample drawn from the Canada Pension Plan’s administrative Record of Earnings data.

(e) *High personal discount rate (or personal rate of time preference)*: “If individuals place little value on future versus current consumption, then this would decrease demand for standard life annuity products, which, by their very nature, are designed to transfer resources to (uncertain) future periods” (Brown, 2008, p.199). Webb (2009) postulated that such shortsightedness could be driven by a desire for immediate consumption and/or a lack of understanding of long-term consequences.

Rather than shortsightedness, however, a high personal discount rate at retirement could be the desire to enjoy certain forms of consumption (e.g., travel) while health is sufficient for it to be practical and enjoyable, leading to a preference for consumption earlier in retirement.

(f) *Short life expectancy*: Some individuals in poor health could be averse to annuitization because they do not anticipate a long future lifetime, and therefore view annuities as expensive (Brown, 2001; Finkelstein and Poterba, 2002; Gardner and Wadsworth, 2004; Daykin, 2004; and Horneff et al., 2008). For example, annuities were most attractive to individuals in a UK survey with higher educations, reduced household size, higher income, and whose major pension source is DC or personal savings (Gardner and Wadsworth, 2004). Many of these characteristics are associated with longer life expectancies; consequently, such individuals would expect to gain the most value from annuitizing their wealth since they would benefit from the mortality risk pooling. In contrast, individuals with characteristics associated with *shorter* life expectancies would be averse to annuitization since they cannot get a “fair value” annuity given their profile. Enhanced/impaired life annuities are intended to accommodate individuals who are assessed to have a markedly lower expected lifespan. The market of enhanced/impaired life annuities in Canada and the U.S. is, however, still underdeveloped and considers only health as a source of impairment while many factors such as education, income and occupation are significant variables in predicting mortality (Brown and Scahill, 2010).

¹¹ Risk aversion is the degree to which an individual is not willing to take on financial risk (volatile income stream in this case) in return for a potentially greater return.

(g) *Ability to pool risk within families*: Another explanation behind the aversion to annuitization is that households have the ability to pool their risk within families, and there is consequently lower utility to be gained by annuitization (see Brown and Warshawsky (2001) for further discussion). In particular, the risk-sharing between spouses likely diminishes the appeal of annuities and, as most retiring individuals are married, the demand for annuities is lessened at retirement (*ibid*).

The pooling of intergenerational resources within families is also common in many cultures and societies. For example, it is common in some traditional cultures for elders to live with, and be financially supported by, their adult children. Within such an arrangement, it is also feasible and reasonable that there is an expectation of inheritance when children accept the risk of supporting parents and a desire to pass on an inheritance by the parents – both of these preferences further reduce the attractiveness of annuitization (see 1b above).

(h) *Confidence in personal financial abilities*¹²: A retiree could believe that s/he will obtain a higher consumption by maintaining control of assets and investing them personally, participating in the equity market, and choosing the withdrawal rate. For instance, Agnew et al. (2008) found that both males and females with high financial literacy are significantly less likely to choose to annuitize and more likely to choose to self-manage, which the authors postulated was owing to their confidence to invest and familiarity with investment vehicles. This opinion was also expressed by the Greenwald et al. (2006) retiree focus group study – in particular, participants felt that they could obtain a better investment return than that generated by an annuity, and that annuitization was better suited to individuals who did not want to manage their own investments or who were financially unsophisticated. For instance, one participant amusingly explained that he would like his wife to annuitize their remaining wealth after his death since he felt that she was not as financially sophisticated as himself - “*I tell my wife that if I should drop dead that (to annuitize) is the first thing she should go do. Because she doesn’t know how to handle money*” (pg. 26).

(i) *Other sources of guaranteed income*: Households could already have guaranteed income streams while living from other annuitized sources, such as employer DB pension plans and Social Security. For instance, the inflation-indexed Social Security payments are viewed as being an adequate level of protection, as well as safer and fairer in pricing than private annuities (Ameriks and Yakoboski, 2003). These sources also include income in the form of income-tested benefits from governments, e.g., Canadian Guaranteed Income Supplement (GIS) benefits or U.S. Supplemental Social Security (SSI) benefits, by which governments share the risks of running out of retirement wealth. Avery and Morrison (2009), Butler et al. (2011) and Pashchenko (2013) showed that this downside protection reduces the value of annuitization, particularly for low-income households.

Milevsky and Young (2007) found that the higher the level of pre-existing annuity income relative to wealth, the less attractive voluntary annuitization became.

(j) *Sources of household wealth*: Retirement savings may be illiquid (e.g., in property or businesses) and not available for annuitization without tapping into the equity (such as through a reverse mortgage). Davidoff (2009) proposed that high levels of housing equity could explain the low level of voluntary annuitization since, like annuities, homeownership serves as a protection against

¹² This explanation could be considered rational or behavioral, depending on whether the individual is justified in believing that s/he could, in fact, achieve a higher return than that offered by the annuity.

longevity risk since its equity can be drawn on in old age (as well as in the event of illness, thereby also protecting against health shocks (Venti and Wise 2004; Poterba et al. 2011b)).

(k) Insufficient personal savings: “(M)any people have not saved up enough to make buying an annuity a viable option” (Benartzi, 2011: pg.15). In 2011, 50% of U.S. households aged 65-69 had a net worth (excluding equity in own home) of less than \$43,921¹³. In Canada in 2005, 50% of households aged 65-69 held less than \$44,400 in net financial savings, while only 29.5% held over \$100,000 and 10% held over \$400,000¹⁴. Benartzi et al. (2011) examined the payout decision between lump sum and annuitization for a large number of pension plans and found that individuals with low savings tended not to annuitize - the average annuitization rate is, consequently, deceptive because there are so many accounts with trivial balances

(l) Debt: A related explanation to the annuity puzzle is the existence of debt among retirees. Reducing debt using financial savings makes more financial sense for many retirees than purchasing an annuity, particularly high-interest debt. For example, Malcolm Hamilton advised that debt reduction should be “mission one” over retirement savings (Chevreau, 2008). In 2011, the median total debt was \$70,000 for U.S. households aged 55-64, and \$40,000 for U.S. households aged 65-69¹⁵.

(2) Rational decision arising from environmental limitations:

(a) Expensive pricing: Annuities are overpriced from an actuarial perspective in that the actuarial present value of the premiums is greater than the actuarial present value of the benefits (Mitchell et al., 1999; Orszag, 2000). This is owing to the insurer’s administrative costs that are built into the premiums to cover marketing costs, corporate overhead, income taxes, regulatory compliance, contingency reserves, and profits, as well as the expensive mortality assumptions whose necessity arises from adverse selection.

Adverse selection occurs because voluntary annuitization is most appealing to retirees whose good health creates the expectation of a long life and whose higher-than-average net worth makes longer life more probable (Mitchell et al., 1999). The generally better mortality of this self-selected group relative to the average population causes insurance companies to assume longer life expectancies and thus to charge higher prices for annuities. Adverse selection can therefore create a vicious circle. As longevity expectations increase, annuity providers charge higher premiums to protect themselves against the risk of adverse selection. This in turn deters potential customers and decreases purchases, thus creating a more select group of purchasers, and so on (Babbel, 2008). This inherent contingency results in expensive annuities that can be unaffordable for many customers for whom they would otherwise be desirable. Adverse selection has been observed to be particularly strong for particular combinations of product type and contract size (Brunner and Pech, 2005).

¹³ Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel, Wave 10. For definition of “Net Worth”, see <http://www.census.gov/people/wealth/about/faq.html>

¹⁴ Based on the 2005 Survey of Financial Security weighted household data. We calculate net financial assets as the sum of registered financial assets and non-registered financial assets (chequing accounts, GICs, trusts, etc), less non-mortgage debt (credit card, lines of credit, car loans, etc).

¹⁵ Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel, Wave 10.

In addition to the impact of current adverse selection when pricing annuities, financial institutions also need to account for their exposure to systematic mortality improvements¹⁶ and the lack of available assets to hedge their annuity products (Brown, 2008; Rashbrooke, 2007).

Mitchell et al. (1999) calculated that the additional expense from an annuity's transaction costs is 18 to 25% of the value of the benefit for an individual chosen at random from the population, and over 10% was owing to the effect of adverse selection. James and Song (2001) found that the expense loadings were somewhat lower in other countries around the world. Calculations done by Babbel and Merrill (2006) suggested that the rates reported by Mitchell et al. (1999) have since declined.

Daykin (2004) explained that the calculated expense loadings are very sensitive to the mortality assumptions of the researcher and that, in practice, it is more likely that consumers receive very good value for their annuity purchases since insurers have generally under-priced annuities by not incorporating sufficient future mortality improvements in their assumptions. Indeed, Babbel (2008) found that the load from sales and administrative expenses on more current annuities were lower than the investment expenses incurred when self-investing in a mutual fund. This situation could continue in the U.S., but longevity pricing (and hedging) has more recently become an important feature of the UK annuity pricing market.

(b) Poor financial market environment: Retirees could be dissuaded from annuitizing because of current poor financial market conditions (low underlying interest rates or a drop in the value of their accumulated wealth). Work by the OECD (2009) showed the magnitude of this impact on a retiree wishing to annuitize wealth during the market crash of 2008: a hypothetical American with a portfolio of 40% government bonds and 60% domestic equities portfolio could have received an income stream that was 60% higher had they purchased a 65 year-old life annuity in 2007 rather than the end of 2008.

The higher the interest rate used in pricing an annuity, the sooner individuals will be willing to annuitize (Horneff et al., 2008) and the more wealth they would be willing to annuitize (Babbel and Merrill, 2006). In addition, lower equity premiums and higher stock market volatility both encourage annuitization (and vice versa) (Babbel and Merrill, 2006). Blake et al. (2003) similarly observed that a well performing fund would encourage a retiree to delay annuitization, and a poorly performing fund would increase the desirability of annuitization.

(c) Incomplete Annuity Market: "(A)nnuity markets around the world are far from 'complete': many private sector annuity products lack key features that would allow consumers to better match the annuity income with their desired consumption path" (Brown, 2008, pg. 9). Hence, people could choose not to annuitize owing to a mismatch between their desired consumption path and the payment stream of available annuities (Davidoff et al., 2005). For example, most payout annuity products sold in the U.S. by insurance companies are fixed in nominal terms. The market for inflation-indexed annuities is quite limited in the U.S., and nearly nonexistent in Canada, despite their value in sustaining an individual's standard of living throughout retirement. Doyle and Piggott (2003) found inflation-indexed annuities to be the most valuable drawdown strategy for the rich and the risk-averse. They postulated that the loadings on these products in the commercial market are much higher than on fixed annuities, thus discouraging their purchase. Indexed annuities could also

¹⁶ These are the mortality improvements that affect the entire population, and therefore cannot be diversified by insuring a larger group of annuitants.

involve a cap on the level of inflation that is indexed, reducing the protection against unanticipated inflation precisely when it would be most valuable.

Another example of incomplete markets is that a retiree could intend to reduce consumption with age, but such an annuity is not available (beyond the inherent loss in purchasing power in nominally fixed annuities). The availability of deferred annuity contracts is also limited in the U.S. market (Brown, 2009a). A last example of an incomplete market is if the income stream of a joint and last survivor annuity does not reduce to the desired percentage after the death of the first spouse (Mitchell et al., 1999).

(d) Access: In the U.S., annuitization as a distribution option is relatively rare among retirement savings plans, and becoming more so (Perun, 2004). Plan participants are consequently unable to access an annuitization option through their plan, and are further deterred by the overly complicated process of purchasing an annuity privately, where they would need to (Brown, 2009b)

- a. overcome the lure of a lump sum,
- b. become convinced of the value of an annuity despite its lack of popularity,
- c. select an insurance company and product from among the many,
- d. and likely pay a higher price than had they been able to purchase the annuity through their employer. The higher price arises because there are higher administrative costs and more expensive mortality assumptions (since participants are more self-selected in the private market, thus producing more adverse selection).

(e) Seller Incentives: Given the obstacles given in 2d, “(p)erhaps annuities fall into the same mental category of life insurance, about which there is an old saying that it is not bought, it must be sold” (Benartzi et al., 2008). In fact, the very few surveyed retirees who held annuities in the Greenwald et al. (2006) focus group study all reported that they had not “sought out the product. They were persuaded by financial advisors to buy” (pg. 25). If people typically buy annuities in response to a sales presentation, an often-ignored explanation of the annuity puzzle is the aversion of financial advisors to sell single premium immediate annuities where they lose future access to the funds and rollover commissions (Tomlinson, 2011).

A recent study sponsored by the SOA and prepared by the Financial Literacy Group addressed the related issue of the barriers that non-affluent consumers experience in getting reliable financial advice (Iannicola and Parker, 2010). They noted significant problems at the individual, social, and institutional levels, including low financial literacy levels of the individuals, issues of trust, and mechanisms for remunerating advisers that may lead to conflicts of interest as to the services and investments that they recommend. A key statistic was that only 11% of financial advisers are interested in providing advice to clients with less than a quarter-million dollars in assets.

(f) Distrust of annuity providers: There could exist a lack of trust or confidence in insurance companies and financial institutions in general. For instance, Gardner and Wadsworth (2004) found this to be the second leading cause behind the aversion to annuitize in the UK according to survey evidence. Babbel and Merrill (2006) showed that even a minor risk of insurer default without the protection of state guaranty associations had a significant impact on the level of rational annuitization. Rashbrooke (2007) explained that the low levels of regulation in New Zealand have created a view that annuities are a poor value for their money.

(g) Sex-distinct mortality assumptions: Annuities are commonly priced using sex-distinct mortality tables; consequently, an annuity for a female is priced 10 to 15% higher than that for a man of the

same age since her expected lifespan is statistically longer (Daykin, 2004). Sex-distinct annuity pricing has the possible disadvantage of discouraging women from annuitizing, while unisex annuities could similarly discourage men. Some argue “that it is unfair to charge a different premium to a woman than a man of similar characteristics just because statistical expectations for women as a class differ from the expectations of men as a class... (seeing that) an individual woman may live for exactly the same lifespan as a similar man” (*ibid*, pg. 14). Daykin further noted the opposing view – that treating everyone as an individual without relying on statistical averages would destroy the risk sharing foundation that underlies insurance in general. Nevertheless, some governments mandate unisex mortality tables and the insurance companies in these countries have been able to operate under these regulations (*ibid*). In fact, a recent ruling by the Court of Justice of the European Union prohibits any risk classification by gender for insurance premiums, which includes life annuities (European Union memo, 2011).

(h) *Tax treatment*: Depending on the country, tax treatments could be relevant if a decision to receive annuity income means not taking advantage of more favorable tax treatments, such as that accorded to capital gains. This rational behavior has been largely ignored in past literature owing to the complexity of including such tax impacts when comparing the consumption outcomes associated with annuities versus managed drawdowns (this is discussed further in Section “How SHOULD” under “Discussion on Research Methodologies”).

(3) Behavioral biases

(a) *Decision framing*: Brown et al. (2008) used survey evidence to show that under-annuitization is propelled by the individual’s psychological outlook on annuities as an investment rather than a vehicle to sustain his/her retirement – in particular, instead of viewing the question of annuitization through a “consumption frame (focusing on the end result of what can be spent over time), many consumers adopt an investment frame (focusing on the intermediate results of return and risk features when choosing assets, and not considering the consequences for consumption)” (pg. 3). Owing to their short-term focus on risk and return and their lack of concern over lifetime consumption, annuities appear as a very risky and unattractive investment since there is a positive probability of losing the entire amount (that is, the probability of death). Individuals with this interpretation fail to realize that it is the forfeiting of their wealth at death that enables the insurer to offer a mortality premium (a guaranteed stable income for the remaining lifetime of the annuitant calculated using a rate of return above the risk-free rate). Similarly, Webb (2009) suggested that households are disinclined to annuitize because they “misunderstand the nature of risk” in that they are overly concerned with losses and gains in the short-term and neglect the more important goal of being able to sustain a smooth consumption over the long-term. Benartzi et al. (2011) built on Brown et al. (2008)’s work by showing that lower annuitization rates occur when employer pension plans encourage an “investment frame” in the communication of its benefits rather than a “consumption frame”.

The issue of framing also includes the manner in which annuities and their alternatives are presented to consumers – Agnew et al. (2008) found that a biased 5-minute film that either promoted annuities or investment alternatives had a substantial effect on a consumer’s decision, which suggested that financial advisors could substantially affect their clients’ decision to annuitize simply in the manner in which the information is presented. This result reinforces the importance of advisors working in the best interests of their clients (see 2e).

(b) *Longevity gamble*: A life annuity could be viewed as “a bet with the insurance company. You are betting (and hoping) that you will exceed your median life span; they are betting (and perhaps

hoping) that you will not. Of course, they wish you personally no harm, but your prolonged health is definitely not the insurance company's first priority" (Milevesky, 2002, pg. 11). The odds in this gamble favor the insurance company from the perspective of someone from the general population since insurance companies use experience-based mortality tables that assume a longer than average lifespan (*ibid*). Owing to this perception, individuals may practice mental accounting, such as asking themselves "will I live long enough to make back my initial investment" (Brown, 2009a, pg. 194).

(c) *Perception of insurance*: Brown (2009a) speculated that individuals do not buy annuities because they believe that insurance is only for "bad" events – since living a long time is not considered "bad", they do not see the value of the life annuity's longevity insurance.

(d) *Absence of comprehensive plans*: Webb (2009) proposed that households may follow rules of thumb when managing their wealth in retirement – that is, they do not develop a retirement consumption plan that comprehensively includes all of their retirement income sources (Social Security, employer plans, housing wealth, etc.), but rather consider each income source separately and follow social norms.

Similarly, Greenwald et al. (2006) found that retirees rely on intuition in their long-term financial planning, such as when setting asset level goals and changing spending levels and asset allocations. The authors suggested that the absence of long-term planning arose from the retirees' ability to adjust to financial setbacks during their working life. This is supported by the substantial earnings variation of the general Canadian workforce described in Morrison (2000). Such variation could create the perception in workers that they can adjust consumption as required after retirement as they did before.

(e) *Control*: The irrevocable and absolute nature of the annuity decision could potentially be responsible for aversions that are not fully rational. For instance, handing the control over one's life savings to an insurance company could be intimidating for some, even for those who have minimal future financial uncertainty and have full confidence in their annuity provider. "It is well established that once people think they have something, they become reluctant to give it up" (Benartzi et al., 2011, pg. 147).

In addition, individuals could be attracted to the prospect of managing their annual income, having likely spent their entire adult life receiving a bi-weekly paycheck whose level was pre-determined and likely difficult to alter. Brown (2009a) referred to this behavioral bias as "the illusion of control" and explained "individuals may well believe that they have more control over their financial future by holding wealth rather than receiving income" (pg. 196).

(f) *Buyer's remorse*: Babbal and Merrill (2006) highlighted the impact of "buyer's remorse" on the annuity decision. The "buyer's remorse" is the potential regret of the annuitant if interest and mortality assumptions change so that they could have purchased their annuity at a better price. This potential remorse could cause retirees to delay their purchase, and potentially never annuitize.

(g) *Regret aversion*: Similarly, Brown (2009a) discussed the potential for "regret aversion", in that an individual wants to avoid the regret of purchasing of an annuity *altogether* – for instance, if s/he were to be diagnosed shortly thereafter with a fatal disease.

(h) Misinformation: Imperfect information is another possible explanation behind the lack of annuitization, such as an ignorance of their features and availability (Brown and Warshawsky, 2001; Babbal and Merrill, 2006; Perun, 2004; Greenwald et al., 2006). In fact, “consumers have very little knowledge about annuities or understanding of how the product works” (American Council of Life Insurers, 1999, p. 16); consequently, they do not understand the benefits of annuitization. Plan sponsors are generally a good source of pension education for their members, but since many offer only lump sum distributions, retirees are very often left misinformed on the benefits of annuities.

(i) General financial illiteracy: Research suggests that people generally have poor financial literacy, which affects their ability to appropriately plan for retirement (possibly including the decision to annuitize) (see Brown (2008) for a discussion of this topic). Financial illiteracy is particularly problematic for low-wealth elders, as financial advisers tend not to serve the lower-wealth segment of the population (Iannacola and Parker, 2010). Further, low-wealth seniors are especially exposed to the consequences of bad decisions since the utility of each dollar is relatively greater than someone with higher wealth.

(j) Individuality: Daykin (2004) noted a growing social trend towards individuality, rather than working as a collective, which works against the risk-pooling spirit of annuities in the UK.

(k) Default options: The default payout option of an employer’s pension plan has a strong effect on the behavior of participants; consequently, when annuities are not the default option, the choice to annuitize is lessened (see Brown (2008) and Rappaport (2008b) for a review of the influence of default options on the annuitization decision).

(l) Historical view on personal retirement savings: The shift from the traditional DB pension schemes toward individual savings is a relatively recent phenomenon – for instance, it is only in recent years that the first cohort of U.S. workers with significant non-annuitized retirement wealth are entering retirement (Webb, 2009). Since traditional DB employer pension benefits were annuitized by design, it is possible that any additional personal savings were historically seen as “extra”, discretionary wealth. Although this is no longer the case for many future retirees, there could exist a continuing gap between the general view on personal savings and the actual shift that has occurred in the pension world.

(m) Procrastination: Procrastination is also a possibility - it is easier to do nothing than something, particularly when it comes to a very important decision¹⁷. The obstacles in purchasing an annuity given in 2d likely further exacerbate this general aversion to making consequential decisions.

(n) Other: Other feasible behavioral biases include (i) the aversion of individuals to think about unpleasant events such as dying or being old and poor (Brown, 2009a), (ii) ignorance on the probability of survival (ibid), and (iii) fear of the potential negative opinions of others regarding the purchase given that annuitization is not popular¹⁸.

Individuals could feel disinclined to annuitize for a single reason, or a combination of reasons. For instance, Dushi and Webb (2004) examined the effect of combining several factors and found that a combination had more success in explaining the low demand for annuitization than testing them

¹⁷ Malcolm Hamilton proposed this explanation via personal correspondence in May, 2011.

¹⁸ Malcolm Hamilton, May 2011.

separately. These explanations are not, moreover, necessarily independent of each other. Babbel and Merrill (2006) found that individuals with lower levels of risk aversion are more discouraged to annuitize by the extent of price loadings than an individual who is more risk averse. In addition, only the very risk averse would annuitize at a low interest rate, while the more risk-tolerant would require a higher rate (Horneff et al., 2008). The risk of inflation is also a higher concern for risk-averse individuals (Brown and Warshawsky, 2001). Males are more tolerant of risk than women and are also less likely to annuitize (see Babbel (2008) for a discussion). Other personal characteristics that have also been found to be associated with risk aversion include income, marital status, and education. Brown et al. (2008) discovered that those exhibiting a short-sighted “investment frame” also displayed less concern for longevity risk and an increased dislike of illiquidity and loss of bequest, suggesting that when individuals view their retirement savings as a continuing investment rather than a source of consumption, their priorities become shifted.

A possible explanation behind the decision framing hypothesis suggested in Brown et al. (2008) is that the continuing-investment perspective is perhaps more common among individuals who pool their risk within their families, which are continuing entities, in contrast to individuals whose outlook on financial planning is limited to their death in the finite future. A clear example would be a family business that is not liquidated (and the wealth is therefore not annuitized) at retirement – rather, it is passed down to the next generation and managed with a focus on profit and sustainability.

There are weaknesses in some of the above explanations for annuity aversion. For instance, Davidoff et al. (2005) noted that empirical data does not suggest that households annuitize at later ages, therefore 1c (the desire to delay annuitizing in anticipation of a better price from higher mortality premiums) is not likely the driving force behind the lack of annuitization. Brown et al. (2008) observed that the annuity demand does not significantly differ between those who indicate that they have a strong bequest motive and those who do not (1b). Brown et al. (2008) also explained reason 1g (that individuals pool risk within their families) should create a higher demand for annuitization after the death of a spouse, but this is not the case in reality. Babbel (2008) showed that pricing could not completely explain the aversion to annuitization (2a), by referring to a study¹⁹ where the vast majority of retirees chose a lump sum payment over an annuity, although the annuity’s pricing was incredible (having an underlying guaranteed interest rate that was nearly three times the prevailing rate in the capital market, and approximately twice as high as the expected return on risky assets at that time). The lack of inflation protection available in the market (2c) is also not a satisfactory explanation since in countries where inflation-indexed annuities are widely available, such as the UK, they are in low demand (Finkelstein and Poterba, 2002; Orszag, 2000).

The disinclination to annuitize is exhibited in more than just the annuitization of traditional financial wealth. For example, when investigating the optimal drawdown of housing wealth during retirement, Sun et al. (2006) found that, for all but the most risk tolerant, the optimal form of payout when taking a reverse mortgage was a lifetime annuity – nevertheless, only a small minority of borrowers chose this option in practice, and the general preference was to keep assets liquid by selecting a line of credit.

Substantial literature has analyzed the optimal level of annuitization under various individual preferences (primarily, preferences regarding financial risk and desire for bequests) and financial market environments. Examining the pre-tax income obtainable from retirement savings alone, they have

¹⁹ The study was published in Warner and Pletter (2001).

nearly all concluded that some level of annuitization is optimal even after modeling many of the drawbacks listed above.

Self-Managed Drawdown Strategies

A primary advantage of self-managed drawdown strategies relative to annuitization is that the control of assets remains with the individual – an attractive feature given the unknown and uninsurable expenses that can arise during retirement, such as divorce, unplanned medical expenses, and unforeseen needs of family members. As explained in Section “How Could” under “Annuitization”, having access to a pool of capital when a financial need arises could mean not having to borrow at unfavorable rates or being obliged to reduce spending. Having access to liquid funds further allows the flexibility to better integrate retirement financial resources – for example, while funds last, a retiree can meet his/her current spending needs with precision by making withdrawals that perfectly top-up other sources of consumption such as those that are less liquid (home ownership), fixed (Social Security, government transfers, and employer DB pension plan benefits), and/or difficult to predict (inheritance and informal support in the form of money and services from friends/family). More importantly, it leaves the opportunity to make appropriate adjustments based on changing needs and circumstances, unlike the irrevocable nature of the annuitization decision.

Self-management also offers the possibility of consuming more relative to annuitization if investments thrive and/or financial savings is used towards reducing high-interest debt. It further avoids “wasting” money on an annuity if death comes and wealth would have remained for bequests had it been self-managed. This feature is especially valuable in the case of an early death when the account balance, which would be at its height or near to it, would have otherwise been forfeited if the retiree had decided upon annuitization.

When self-managing wealth, however, a person needs to balance two competing risks: (1) consuming too much and needing to reduce consumption in later years (possibly outliving wealth) or (2) consuming too little and suffering an unnecessary reduction in consumption (Brown, 2009b). In other words, the individual is taking on the longevity risk, and could suffer a reduction in standard of living either because of long life or poor financial market performance. In addition, the individual is also taking the responsibility of investing his/her wealth and managing its drawdown – for some risk-averse individuals, the volatility and complexity of the financial market could become burdensome (Ameriks et al., 2001).

Self-management also suffers from “mortality drag” – that is, it forfeits the mortality premium of survival inherent in annuitization, which can be quite substantial at advanced ages. Further, fees from financial advisors and transactions could, depending on the investment vehicles used, generate higher operating expenses than those included in the cost of purchasing an annuity (Daykin, 2004).

Another disadvantage is that, although there is the potential that money will be left to heirs, the amount and timing of the bequest are unknown (Davidoff et al., 2005) (although, Section “How SHOULD” explains how this can be avoided). Ironically, a longer lifespan will increase the retiree’s dependence on informal caregivers and concurrently reduce the size of his/her bequests (Babbel, 2008). The intended heirs may, in fact, ultimately financially support their anticipated benefactor if financial markets are poor, the retiree lives longer than budgeted for and/or wealth is inadequately managed. Having access to a large pool of liquid assets could also create personal problems for the retiree – such as disputes between an economical individual and his/her lavish spouse, or the temptation of friends and family to request personal loans and investments into their business ventures (see Babbel (2008) for an account of

this latter situation). Having never been retirees, friends and family could potentially be inconsiderate of the fact that a retiree generally does not have an earning potential and that his/her savings are intended to be a source of consumption, and not a source of carefree distribution. In addition to family pressure, the liquidity of the assets could expose the retiree to fraud.

There is further a behavioral bias in that individuals could find difficulty in drawing down the retirement “nest” after having foregone so much consumption in building it. Consequently, they could live an unnecessarily reduced lifestyle during retirement, and their savings may even accumulate rather than decrease (see Section “How DO” for empirical studies supporting this possibility).

Lastly, from the collective’s perspective, self-managed drawdown strategies also put a larger burden on governments to properly educate retirees in prudently drawing their retirement savings and wisely managing the associated risks. From the perspective of governments and the taxpayers that fund them, the risk of seniors not sustaining a suitable standard of living also increases the expense of income-tested government transfers and minimum pension guarantees offered by the state²⁰. In contrast, from the perspective of the individual, choosing a self-managed strategy has the advantage that the government sector shares the downside risks associated with running out of money. Any government attempt to manage this downside risk by controlling how individuals spend down their voluntarily accumulated assets could discourage them from accumulating them in the first place. Any such discouragement seems highly undesirable given the widely shared opinions that future retirees are not saving enough.

The types of self-managed drawdown strategies are infinite, but there are several that have been discussed and analyzed in previous research – they fall into two general categories: (1) fixed, where the annual withdrawal is fixed in nominal or real (inflation-adjusted) terms from year to year; and (2) variable, where the payments are not fixed from year to year, but are linked to investment performance.

We next examine some general advantages and drawbacks of the conventional “fixed” and “variable” drawdown strategies from the perspective of the retiree²¹.

Fixed Strategies

In addition to the advantages of self-managing wealth in general, the advantages specific to fixed withdrawal strategies are (1) the simplicity, since withdrawals are level from year to year (2) the convenience in budgeting since the withdrawals are known in advance, so long as the wealth lasts.

The major disadvantage is that there is a possibility of running out of wealth. Owing to this possibility of ruin, Blake et al. (2003) found that fixed withdrawal strategies were especially unattractive (that is, the value of their discounted expected utility was relatively very low).

²⁰ Using stochastic simulation, Doyle and Piggott (2003) found that, for countries with a mandatory DC state pension system, the cost of the government’s minimum pension guarantee was considerably higher if the citizens followed a self-managed drawdown strategy than had they purchased either a fixed or variable annuity.

²¹ Note that these drawdown strategies are those examined in this line of literature. Section “How SHOULD” proposes others (under “Discussion on Research Methodologies”).

As an aside, the financial literature uses the term “ruin” as a convenient shorthand for running out of wealth. It does not imply that an individual in this situation has necessarily suffered catastrophic damage. In the Canadian public pension system, for example, the combination of typical Canada Pension Plan benefits in conjunction with the Canadian social pension benefits (universal Old Age Security and income-tested Guaranteed Income Supplement) is sufficient to lift most seniors above “low income” (as measured by Statistics Canada’s Low-Income Cutoffs (LICO)). Indeed, the proportion of Canadian seniors falling below the LICO levels is considerably below the rates seen in working-age Canadians during the accumulation phase (Health Canada, 2002). Research employing the probability of “ruin” has generally favored annuitization although real-life circumstances could be far from favorable – for example, a senior who has fully annuitized his retirement portfolio may find that he cannot cover an extraordinary expense, and be unable to secure a loan - but by definition he is not subject to “ruin”.

The following is an illustrative list of several of the better-known fixed drawdown strategies. For each of them, bullet (a) gives the strategy’s name and description, (b) shows the withdrawals using formulas (t is current time and R is the time of retirement), and (c) includes some observations made in past studies²². In each of the fixed strategies shown, the withdrawal is fixed in real terms (i.e. inflation-adjusted), although they could also be fixed in nominal terms, as we explain below.

1. Spend *initial* wealth over a fixed number of years that is specified at retirement;
 - a. The withdrawal is set at retirement to equal the total initial wealth divided by a fixed withdrawal-period parameter, such as:
 - i. the person’s life expectancy at retirement;
 - ii. the person’s disability-free life expectancy at retirement, such as 12 years²³;
 - iii. the remaining years until maximum age in the mortality table is reached (Dus et al., 2004).
 - b. $Withdrawal_R =$
 - i. $Wealth_R / LifeExpectancy_R$
 - ii. $Wealth_R / DisabilityFreeLifeExpectancy_R$
 - iii. $Wealth_R / (MaximumAgeInMortalityTable_R - Age_R)$ $Withdrawal_t = Withdrawal_{t-1} (1 + Inflation_{t-1})$ for $t > R$
 - c. Notes: If investment returns exceed inflation, then withdrawals will be sustained for longer than the intended periods - life expectancy, disability-free life expectancy, or maximum age in the mortality table – since the formulae do not include anticipated real returns. As individuals are approximately 50% likely to live beyond their life expectancy, however, there is still a good chance of outliving assets in strategy (i) even if investment returns exceed inflation. More precisely, if investment returns equaled inflation, then “a strategy of consuming one’s wealth over any fixed period, even if flawlessly executed, has a probability of failure that equals the probability of surviving to the end of that period.” (Webb, 2009, pg. 16).

The advantage of strategy (ii) is that the individual will enjoy a higher level of withdrawals during disability-free years when leisure activities such as travel are more feasible than at advanced ages when activities are more likely limited by long-term health conditions (Avery

²² In an attempt to simplify previous findings regarding these strategies, we do not include the numerous assumptions underlying each study’s analysis.

²³ Strategies #1 (ii) and #3 (ii) are slight modifications of a strategy described in Avery and Morrison (2009), which is given in #4 (ii).

and Morrison, 2009). The drawback of (ii) is that the individual will exhaust the portfolio quite soon, causing reliance on other sources – such as government programs and/or informal network of family and friends. If the denominator in (iii) is large, as is likely, then a bequest is certain if investment returns exceed inflation; the disadvantage is, however, low annual withdrawals.

2. Fixed or non-fixed fraction of initial wealth;

- a. The withdrawal is set at retirement to equal a fraction of the initial wealth, such as:
 - i. a fixed fraction (a popular example is the 4% Rule, where households consume 4% of initial wealth each year – see Ameriks et al. (2001) for a short history on the development of this strategy as well as further analysis);
 - ii. a nonfixed fraction (such as the proportion of wealth that would generate the same income as the payout of a inflation-indexed life annuity purchased at retirement (Blake et al., 2003; Horneff et al. 2008)).
- b. $Withdrawal_R = Fraction_R \times Wealth_R$
 $Withdrawal_t = Withdrawal_{t-1} (1 + Inflation_{t-1})$ for $t > R$
- c. Notes: The 4% Rule will most likely succeed in delivering an inflation-indexed fixed level of withdrawals over an individual’s lifetime (for a summary of earlier articles that examined the adequacy of 4%, see *Retire Early* (1998) and Ameriks et al. (2001).). Webb (2009) noted, however, that purchasing an index-linked annuity would deliver a higher income than the 4% rule without the risk of outliving wealth. In addition, the sustainability of the 4% rule is strongly dependent on the financial environment, age of retirement and anticipated longevity (Webb, 2009). Consequently, the 4% value could be taken as a parameter that depends on gender, the age at retirement, and the retiree’s risk tolerance (Avery and Morrison, 2009; Cooper, 2008, Chapter 9).

Strategy 2(ii) is known as “self-annuitization” (a step-by-step guide on self-annuitizing for the individual is given in Steiner (2010a)). This approach links the payouts to both interest rates and mortality expectation at retirement.

In a fixed withdrawal strategy, there is the option to not adjust the withdrawal stream by inflation (that is, the withdrawal would be fixed in nominal terms rather than real terms), or to adjust it for only a portion of inflation. The advantage of not adjusting the withdrawal fully for inflation is that the wealth will be consumed more slowly, which decreases the probability of ruin and increases the probability of a bequest. The downside is, of course, that the purchasing power of the withdrawals decrease, which becomes a more significant problem the longer someone lives owing to the cumulative and corrosive effect of inflation.

The objective of the fixed strategy is the periodic withdrawal of a given, constant amount, often measured in inflation-adjusted dollars, until death or the exhaustion of the portfolio intervenes. Fixed strategies are consequently the most easily analyzed drawdown strategy when only “pre-tax and savings-only” income is evaluated (as has been the case for the vast majority of past published studies - see the Section “How SHOULD” under “Discussion on Research Methodologies”). If actual disposable income is to be smoothed, however, then the retiree would need to tweak the periodic withdrawal amount. For example, some types of investment returns on non-registered assets in Canada are taxable, and consequently this taxation “drag” generally declines as the assets are drawn down over time since the dollar returns are lower.

Variable Strategies

The major drawback of a fixed withdrawal strategy is that the funds could run out earlier than expected if investment performance is poor. For example, if an individual invested his/her assets in large caps in 1999, his/her assets would have dropped to less than half of their worth by 2002 (Kotlikoff, 2006). More recently, many U.S. and Canadian individual account holders lost 20 to 30% of their equity investment values between the summer of 2008 and the spring of 2009. Continuing to consume at the same fixed amount would seem generally unwise after such large drops. The variable strategies effectively manage the investment risk by adjusting the annual payments to reflect investment returns and portfolio modifications. A chief disadvantage is the resulting fluctuations in the withdrawal level, which could create difficulties in financial planning and create undesirable reductions in consumption year by year. For instance, the withdrawals in the worst-case scenarios can become extremely low (Horneff et al., 2008). On the other hand, many families experience substantial earnings fluctuation during the accumulation phase of their lives (Morrison, 2000), suggesting that they may be able to continue to adjust when necessary after retirement. This ability to adjust was also suggested in the Greenwald et al. (2006) survey study.

We next summarize several variable withdrawal strategies (note that t is current time and R is the time of retirement).

3. Spend *remaining* wealth over the remaining duration of a fixed number of years that is specified at retirement;
 - a. The withdrawal is recalculated each year to equal the remaining wealth divided by a deterministically decreasing withdrawal-period parameter, such as:
 - i. the remaining years in the person's life expectancy that was determined at retirement;
 - ii. the remaining years in the person's disability-free life expectancy that was determined at retirement;
 - iii. the remaining years until maximum age in the mortality table is reached (Dus et al., 2004).
 - b. $Withdrawal_t =$
 - i. $Wealth_t / [LifeExpectancy_R - (t-R)]$ for $t \geq R$
 - ii. $Wealth_t / [DisabilityFreeLifeExpectancy_R - (t-R)]$ for $t \geq R$
 - iii. $Wealth_t / (MaximumAgeInMortalityTable - Age_t)$ for $t \geq R$
 - c. Notes: The objective of these strategies is to force the wealth to be consumed in the time frame specified at retirement. While analyzing the behavior of various drawdown strategies, Dus et al. (2004) found that the withdrawals in strategy (iii) are relatively low during the early years, but they rise very quickly at advanced ages for two reasons. First, "reserves" build up and create an increasing level of wealth owing to the ratio's failure to include portfolio returns that are likely higher than inflation. Second, the fraction of remaining wealth consumed grows as the individual ages. Bequests under this strategy rise until advanced ages, at which time they decline quickly.
4. Spend *remaining* wealth over a dynamically changing number of years;
 - a. The withdrawal is recalculated each year to equal the remaining wealth divided by a dynamic withdrawal-period parameter, such as:
 - i. the person's current life expectancy;
 - ii. the person's current disability-free life expectancy.
 - b. $Withdrawal_t =$
 - i. $Wealth_t / LifeExpectancy_t$ for $t \geq R$

- ii. $\text{Wealth}_t / \text{DisabilityFreeLifeExpectancy}_t$ for $t \geq R$
 - c. Notes: These variable strategies guarantee that, unless the value of the assets goes to zero, an individual cannot outlive wealth and there will be an opportunity for a bequest. Dus et al. (2004) found, however, that withdrawals asymptotically approach zero at advanced ages in strategy (i) (and these findings would also apply to (ii)). Payments begin at a moderate level and progressively increase with age as life expectancy decreases. Eventually, however, wealth begins to run out and, although the withdrawal fraction continues to increase, the actual payments begin to decline. Bequests under this strategy decrease with time (*ibid*).
5. Fixed or non-fixed fraction of remaining wealth;
- a. The withdrawal is recalculated each year to equal a fraction of the remaining wealth, such as:
 - i. a fixed fraction of remaining wealth (Dus et al., 2004);
 - ii. a non-fixed fraction, such as:
 - 5% of remaining wealth early in retirement, increasing to 9% by age 85 (Webb, 2009);
 - the proportion of wealth that would generate the payout of a currently priced life annuity purchased with remaining wealth (Blake et al., 2003) (this approach links the payouts to both current investment performance and mortality expectations);
 - another age-related fraction (for example, under the Canadian Registered Retirement Income Funds, the rules of the plan require a minimum withdrawal of a given, age-related, fraction of the assets as of the end of the year).
 - b. $\text{Withdrawal}_t = \text{Fraction}_t \times \text{Wealth}_t$ for $t \geq R$
 - c. Notes: Like strategy 4, this strategy is designed so that the wealth cannot run out, although the payments could become very low.

Many of the variable strategies, such as #3 (i) and (ii), #4 (i) and (ii), and #5 (i), will likely generate payments that decline at advanced ages, which is consistent with the view that younger retirees spend relatively more on travel and entertainment. Households will, therefore, benefit from higher consumption during the early years of retirement when they are more able to enjoy it (Webb, 2009). In addition to leisure spending, it is also popularly thought that overall expenditures decrease with age (Polyak, 2005), which would suggest that strategies should generate withdrawals that fall over time. The influence of retirement and age on spending is, however, controversial (see, for instance, Hamilton, 2001; Denton et al., 2002; and Brzozowski et al., 2010 for Canadian studies). For instance, it could be at advanced ages that higher income levels are most needed owing to declining health and the associated home care and medical expenses.

The last variable strategy is quite distinct and therefore we list it by itself along with its advantages and disadvantages.

6. Spending the interest and dividends, while preserving the capital (Webb, 2009);
- Pros
 - Nearly guarantees that households will not outlive their wealth (as long as the value of the assets does not go to zero).
 - Guarantees a bequest (*ibid*).
 - Cons
 - Annual withdrawals could be zero or very low.
 - Annual withdrawals are extremely dependent on the investment performance of the underlying assets - such a fluctuating withdrawal would create difficulty in budgeting.

- Annual withdrawals are not stable in either nominal or real terms.
- All capital and any capital gains will be unconsumed at death (*ibid*).
- Annual withdrawals will likely be lower than the other strategies.
- The division of assets into “capital” and “interest” is an artificial distinction and contrary to the principles of financial economics.
- Annual withdrawals will be driven by portfolio choice and asset performance, or households will choose their investments based on their income target rather than choose the optimal asset allocation strategy (*ibid*).

Among the self-managed strategies, the most popular recommendation of financial advisors is to allocate 60% of the portfolio to stocks and 40% to bonds, and to withdraw 4-5% of remaining balance per year (Whitaker, 2005). Other advisors may recommend that the balance between stocks and bonds vary by age, such as making a gradual shift toward bonds as the individual ages.

Hybrid Strategies

Finally, there are also hybrid approaches (or “mixed strategies”) – a mixture between annuitization and self-managed investments. We first discuss individually constructed hybrid strategies, and then examine some existing hybrid annuity products offered by insurance companies.

There are many ways that an individual could construct a hybrid strategy:

- One could secure a basic level of income by annuitizing some assets, while self-managing the remainder. For example, one could annuitize a portion of retirement wealth, and divide the remainder into two self-managed portions – the first intended to finance extra consumption in a shorter-term, disability-free span, while the other portion managed through a 4% drawdown strategy (see Section “How Could” under “Self-Managed Drawdown Strategies”) to yield a lifelong income and still provide a source of funds in the event of an unexpected, uninsurable expense.
- One could elect to self-manage one’s assets for a portion of life, and delay annuitization until a later age or a pre-specified event (such as the value of assets dropping below or rising above a particular level). Similarly, some pension plans offer the option of self-management up to a given age, followed by mandatory conversion to an annuity of any funds not withdrawn by that time.
- One could purchase a deferred annuity at retirement that would commence in a fixed number of years with a portion of one’s wealth and self-manage the remaining assets during the interim. This option (the ‘deep-deferred annuity’ or ‘longevity insurance annuity’) is gaining interest. To offset the risk of dying during the deferral, an attractive add-on feature is a benefit on death during this period. Note that purchasing a deferred annuity whose payment are not indexed to inflation would suffer a decline in real value during the deferral period (Shapiro, 2010).
- Further, there is the option of “laddered annuitization” where annuity purchases are spread out over time (Brown, 2009b). For example, an individual could annuitize 20% of his/her initial wealth every year for five years. The remainder of the wealth would be self-managed until the time of annuitization (ignoring investment performance, 80% of the initial wealth would remain to be self-managed in year one, 60% of the initial wealth in year two, etc.). Since many households are averse to annuitization owing to the loss of control over assets and the irreversibility of the decision, this approach could be attractive since its gradual process is less threatening and it provides the option to opt out at any time and preserve the management of the remaining wealth. Second, the gradual purchase would somewhat reduce the financial market risk – in both the market value of the assets and the discount rate underlying the annuity price (*ibid*).

- Some plan sponsors offer “in-plan annuity options” to their working members (Brown, 2009b). Rather than only choosing to invest their retirement saving contributions in a particular fund, members are given the option to use their contributions to purchase deferred annuity contracts that commence at retirement. This approach has the double advantage of securing future retirement income while encouraging workers to reflect on the withdrawal phase of their retirement savings rather than solely wealth accumulation (*ibid*). This approach would also suffer from inflation drag on any deferred annuity payments that are not indexed to inflation.
- Lastly, a hybrid strategy used in Denmark is to purchase a temporary annuity with a portion of wealth, leaving the remainder to be self-managed (Daykin, 2004). Once the term of the first annuity expires, another term annuity is purchased with a portion of the remaining wealth, and so on until the state-prescribed mandatory age of life annuitization is reached, and all wealth must be annuitized.

The downside of a hybrid strategy is that the risks associated with self-managing wealth and the disadvantages of annuitization are still present, but the upside is that diversifying between annuitization and self-management reduces their severity. For instance, there is still a risk of outliving the self-managed wealth or of having a reduction in overall consumption if investments perform badly, but holding an annuity in a hybrid strategy protects the retiree’s income from individual savings from falling below the floor guaranteed by the annuity’s payments. Hybrid strategies also provide the flexibility and the potential for bequests of a self-managed strategy and they enable households to benefit from superior investment performance of any self-managed assets and use the unexpected gains towards either increasing their consumption or enhancing their bequest (Dus et al., 2004). Such a strategy further allows the retiree to retain an emergency reserve of available funds to protect him/her from uninsured financial risks, such as the expenses associated with a long-term medical condition (see Section “How Could” under “Annuitization” 1a).

Consequently, retirees with a moderate risk aversion who would otherwise choose self-management over annuitization, would improve their expected utility by choosing a hybrid strategy from a “pre-tax and savings-only”²⁴ perspective (Horneff et al., 2008; Milevsky and Young, 2007). It is recommended that individuals optimize their investment strategy by first replacing the bond-portion of their portfolio with annuities and, as their risk aversion rises, they then convert the equity portion (Ameriks et al., 2001; Horneff et al., 2008).

A further attractive feature of some of the hybrid approaches is the benefit gained by delaying annuitization. In essence, “The longer you wait to buy an annuity, the more you get” (Clements, 2003). At a given premium and underlying interest rate, the payout of an annuity rises with age owing to the increased probability of not surviving to each future annuity payment. This added return is the “mortality premium” (see Section “How Could” under “Annuitization”). Consequently, delaying annuitization could enhance consumption while protecting the individual from longevity risk later on in life.

Several researchers have suggested that households should delay the purchase of annuities that pay out immediately, or to purchase deferred annuities²⁵. The optimal annuitization age has been observed to

²⁴ This is discussed in Section “How Should” under “Discussion on Research Methodologies.”

²⁵ A table summarizing previously published studies that have examined the optimal time to annuitize (including the researchers’ assumptions and specifications) was given in Blake et al. (2003) (see Tables 3 and 4 therein). This table was then updated and extended in Horneff et al. (2008) (see Table 1 therein).

rise with the retiree's level of risk tolerance, bequest motive and the size of the price loads (Blake et al., 2003; Milevsky and Young, 2002). If there is no bequest motive and the retiree is risk neutral, then the choice to delay annuitization is determined by a comparison between (1) the mortality drag versus (2) the future expected additional return from participating in the capital market over the underlying annuitization discount rate (Blake et al., 2003). Similarly, Milevsky (1998) suggested that an individual should annuitize once the mortality drag equals or exceeds the equity risk premium (the expected excess return on equities over bonds). A more recent study by Milevsky and Young (2007) found that, if an individual could only convert his/her entire wealth to an annuity at one time, then the optimal age of purchase depends on the individual's risk preference, personal health status, the equity premium and the investment's level of volatility. For reasonable levels of risk preference, they ascertained that it would be suboptimal to annuitize prior to age 70. If given the choice of when and how much to annuitize, however, retirees were advised to annuitize some portion of their wealth immediately, where this portion depended on the same factors listed above as well as the proportion of pre-existing annuitized wealth, and then to gradually purchase additional annuities over time depending on their wealth-to-income ratio.

The drawback of delaying annuitization is that the self-managed funds would need to earn a return that meets the mortality drag for it to be worthwhile. In addition, if interest rates fell and/or mortality rates declined, then annuity prices could actually increase rather than decrease with time (Daykin, 2004).

Insurance companies also offer annuity products that exhibit hybrid properties. This category of products is known as investment-linked annuities, and they include with-profits annuities (or participating annuities), unit-linked annuities, variable annuities, and annuitized funds (see Appendix A for a description of each). The advantages of these products are:

- The annuitant can continue to participate in the financial markets as well as benefit from the sharing of mortality risk by receiving an enhanced return from the mortality premium. This advantage is particularly useful during times of low interest rates when a retiree wishes to annuitize but does not want to lock in on the current rate for the rest of his/her life (Milevsky, 2002). By taking on some investment risk, the individual could potentially achieve a much higher return on his/her wealth than having invested in a fixed annuity.
- Having control over asset allocation allows the annuitant not only to benefit from the equity risk premium, but also to rebalance his/her portfolio suitably after shifts in the market and according to personal preferences.
- In the case of annuitized funds, the systematic longevity risk is transferred to the annuitants, thus potentially reducing the pricing loads since insurers no longer must exercise such caution when pricing to protect against non-hedgeable mortality improvements²⁶.
- By comparing the expected utility of different drawdown strategies, Horneff et al. (2007) found that the purchase of variable annuities presented a major improvement in welfare over a pure self-management strategy, irrespective of the retiree's level of risk aversion.
- Variable annuities in particular are reported to have low loads and administrative fees (Horneff et al., 2010).
- Horneff et al. (2007) proposed that variable annuities are a potentially attractive vehicle that can be used by policymakers and plan sponsors to encourage annuitization, as these annuities offer "an appealing compromise between the extremes of a pure withdrawal plan, on the one hand, and a fixed annuity, on the other" (pg. 22).

²⁶ As explained in Section "How Could" under "Annuitization", systematic longevity risk is the risk of mortality improvements that affect the entire population, and therefore cannot be diversified by insuring a larger group of annuitants

- In the case of countries with a mandatory DC type pension system, Doyle and Piggott (2003) found that the simulated expected utility of variable annuities was higher than both fixed annuities and inflation-indexed annuities owing to the potential for higher returns through the additional investment risk and the downward protection offered by the government's guaranteed minimum pension.

The drawbacks of investment-linked annuities are that they expose the annuitant to investment risk (as well as mortality risk in the case of annuitized funds) and, like conventional annuities, the annuity principal is not recoverable once the purchase is made. Further, the payments fluctuate. As for participating/with-profits annuities in particular, there are no guarantees for future increases and the initial annuity payment is significantly lower than a level fixed annuity (Daykin, 2004). They also suffer from a lack of transparency (*ibid*).

Recent literature has increasingly given greater attention to this drawdown alternative. Horneff et al. (2007) explored the value of variable annuities by measuring the welfare gains a retiree can expect from this vehicle. Like Milevsky and Young (2007), they found that a retiree would maximize his/her utility by annuitizing only a portion of wealth at retirement, even if the individual has no bequest motive. Over half of the combined annuity and financial wealth should be initially allocated to stocks, and the remainder allocated to bonds. Over time, the retiree should use his/her financial wealth to purchase additional annuities. Like a conventional annuity, higher levels of wealth and risk aversion increase the attractiveness of variable annuities compared to self-management. In other research, Ibbotson (2007) applied semi-deviation measurements on income returns to evaluate the riskiness of a variable annuity with a guaranteed minimum withdrawal benefit compared to a traditional non-annuity (mutual fund) investment. The authors concluded that the variable annuity provides higher median income levels and less risk than a stand-alone mutual fund portfolio.

How SHOULD Retirees Draw Down their Financial Savings Given an Unknowable Future?

Research Methodologies

Since the future cannot be known with certainty, the best approach to manage retirement wealth depends on *known* factors such as the person's circumstances and preferences, and also on expectations about five *unknowns* – future investment performance, future inflation, future unplanned expenses (including changes to circumstances and preferences), the person's longevity, and the evolution of government tax and benefit programs. We examine the three most common methodologies to quantitatively evaluate alternative drawdown strategies, along with examples of studies that have applied them.

(1) Dynamic programming that employs the maximization of utility functions to solve for the optimal withdrawal path, investment strategy, time to annuitize and/or amount to annuitize

Simulation studies that employ a utility function to represent an individual's "consumption"²⁷ preference is the most common approach to quantitatively evaluate the individual welfare generated from different drawdown strategies (Dus et al., 2004). Studies frequently employ dynamic programming to maximize lifetime utility - examples include Mitchell et al. (1999), Brown (2001), Gerrard, Haberman and Vigna (2006), Horneff et al. (2008), and Webb (2009). The standard utility function generally used features constant relative risk aversion, exponential discounting at a fixed rate, and additive separability²⁸ (Davidoff et al., 2005).

Some studies use a utility framework to determine the optimal strategy, except they do not employ dynamic programming, but rather use approaches such as stochastically simulating the expected utility for each alternative strategy, or by direct solution (examples of studies that fall under this category include Yaari (1965); Milevsky and Young (2002); Blake et al. (2003); Doyle and Piggott (2003); Davidoff et al. (2005); Horneff et al. (2008); Horneff et al. (2007); Koijen et al. (2009); Peijnenburg et al. (2011b)).

Despite researchers' attempts to make "utility maximization dynamic programming" a tool available to the general population, it is difficult to implement such models in practice. For instance, it is very unlikely that an average individual would know his/her risk preferences and other necessary parameters, and most financial advisors would have difficulty understanding these models enough to rely on and explain to their clients. (Gerrard, Haberman and Vigna (2006) discussed the difficulty of implementation.)

(2) Minimizing the probability of lifetime ruin

There is a series of papers that determined optimal strategies by exclusively employing the probability of lifetime ruin as the risk metric²⁹. The probability of lifetime ruin is the probability of wealth reaching zero before death. Many of these authors mathematically solved the optimal strategy that minimizes the probability of ruin – such as the optimal investment strategy, optimal level of wealth to annuitize, optimal time to annuitize, and so forth. To demonstrate their results, some authors inputted parameter values and applied a direct or iterative method to produce a numerical solution to their mathematical expressions. Other studies calculated the probability of ruin by using Monte Carlo simulation (Albrecht and Maurer, 2002).

The probability of ruin metric is a useful tool "to demonstrate and quantify longevity risk to retirees, because it neatly summarizes, in a single number, the likelihood of outliving one's resources" (Brown discussion in Milevsky and Robinson (2000), pg. 126). There is, however, some criticism of the exclusive reliance on the probability of lifetime ruin measure. For instance, the probability of ruin measure:

- does not follow the standard economic theory of consumer utility maximization (Brown

²⁷ Although the term "consumption" is used in this line of research, the amount actually modeled is generally pre-tax income generated by retirement savings alone.

²⁸ The meaning of "additive separability" is that the utility of one period is not affected by a change in the utility of another period. Davidoff et al. (2005) relaxed this feature of the standard utility function by assuming that individuals may exhibit an "internal habit" – meaning "it is not the level of present consumption, but rather the level relative to past consumption that matters for utility" (pg. 1585).

²⁹ Some examples include Milevsky and Robinson (2000), Albrecht and Maurer (2002), Young (2004), Milevsky et al. (2006), Bayraktar and Young (2009) and Wang and Young (2010).

discussion in Milevsky and Robinson 2000, p. 126);

- masks the additional value of strategies that deliver higher consumption than others (Sun et al., 2006);
- can lead to strange conclusions by ignoring tradeoffs between increased consumption, and running out of wealth (such as suggesting that households with a high consumption rate should make risky investments to minimize their probability of ruin, while the more rational advice would be reduce consumption (Sun et al., 2006));
- does not put a value on bequests (Albrecht and Maurer, 2002); and
- does not recognize the magnitude of failure (that is, the income shortfall that would need to be obtained elsewhere to support the planned spending³⁰).

Lastly, lifetime ruin is a matter of definition. Citizens of countries where the government shares in the downside risk by offering social income-tested benefits for seniors will find some income available (for a discussion, see “Fixed Strategies” in Section “How COULD”). “Ruin” can be defined at a non-zero value, such as the level that an individual would be eligible for social assistance (as suggested by Bayraktar and Young (2009)), but this is not generally done by researchers.

(3) Risk-return models

Rather than focus exclusively on the maximization of utility or on the minimization of lifetime ruin, this third approach uses various risk/return measures. In such an approach, strategies are ranked based on the formulated trade-off between risk and return. Such models “have the advantage of developing an explicit measure of risk, an explicit measure of value, and a function reflecting the trade-offs between value and risk. Clearly, individuals prefer more return to less and less risk to more, other things equal” (Dus et al., 2004, pg. 4). In addition to lifetime utility, the measures of “return” include:

- the expected discounted value of the withdrawals (Mitchell et al., 1999; Dus et al., 2004) or the income available for consumption that these withdrawals permit (Avery and Morrison, 2009)
- the expected amount of the original portfolio remaining at the end of a specified period (Ameriks et al., 2001);

and the measures of “risk” include:

- the probability of consumption shortfall
 - $= P(\text{Withdrawal}_t < \text{Benchmark})$
 - this is the probability of falling below a specified target – for example, Dus et al. (2004) chose the payment provided by a lifelong real annuity as their benchmark;
- the mean excess loss
 - $= E[\text{Benchmark} - \text{Withdrawal}_t \mid \text{Withdrawal}_t < \text{Benchmark}]$ (*ibid*);
- the shortfall expectation
 - $= E[\max(\text{Benchmark} - \text{Withdrawal}_t, 0)]$ (*ibid*)
- the expected present value of the shortfall
 - = the sum of all future shortfall expectations, each discounted by interest and the probability of survival to time t (*ibid*);
- the failure rate
 - = the probability of running out of money before the end of a specified period (Ameriks et al., 2001)³¹;

³⁰ Proposed by Joseph Tomlinson via personal correspondence in October, 2012.

³¹ When the specified period is lifetime, this measure then becomes the probability of lifetime ruin.

- the standard deviation (Ameriks et al., 2001; Avery and Morrison, 2009);
- the percentile values, such as
 - the 5th, 10th and 50th percentile values for the fund size distribution in each period (Ameriks et al., 2001);
 - probable minimum withdrawal (such as 1%, which is the first percentile of the withdrawal distribution in each period (Horneff et al., 2008));
- the distribution of return values (Avery and Morrison, 2009); and
- risk/return values by attained age (Ameriks et al., 2001, Dus et al., 2004; Horneff et al., 2008; Avery and Morrison, 2009)
 - examples include expected annual benefit, expected fund size, standard deviation and other risk/return measures. Similarly, Dus et al. (2004) plotted mean bequests by age of death.

The return and risk values have been computed using several approaches:

- using past investment experience from empirical data
 - for example, testing for retirement dates between 1946 and 1970, Ameriks et al. (2001) calculated the maximum sustainable withdrawal that a retiree could have made over a 30-year time period from various investment portfolios.
- Monte Carlo simulation projections, where the stochastic elements could be the investment returns and/or the time of death (Ameriks et al., 2001; Dus et al., 2004; Avery and Morrison, 2009);
- deterministic projections (Mitchell et al., 1999)

To illustrate a Monte Carlo or deterministic approach,, the expected discounted value of the withdrawals could be computed either:

- stochastically (equaling the average discounted lifetime withdrawal for a large number of independent simulated lives (Avery and Morrison, 2009)); or
- deterministically (equaling the sum of all future expected withdrawals, each discounted by projected interest and the probability of survival (Mitchell et al., 1999; Dus et al., 2004)).

Discussion on Research Methodologies

In general, findings based on any of these three methodologies are very dependent on the assumptions of the researcher, such as the mortality assumptions and the size of the assumed equity risk premium. For instance, a long life expectancy assumption for the individual improves the value of the longevity insurance feature of annuitization. On the other hand, raising the equity risk premium assumption would increase the attractiveness of self-managed strategies since the value of the mortality premium inherent in annuitization would be shadowed. The converses are similarly true.

In these three methodologies, the unit of measurement can be pre-tax, post-tax, or a comprehensive income measure that attempts to include all sources of retirement income affecting consumption (financial savings, debt, pensions, taxes and government transfers, as well as imputed income from home ownership). Measuring the pre-tax income generated from financial savings alone has been the practice among previously published research that quantitatively compares alternative drawdown strategies. Consequently, nearly all of the findings reported throughout this paper are based on the “pre-tax and savings-only” approach.

In the real world, however, retirement financial well-being depends on income from all sources – i.e. it is an integrated problem. If income sources are considered in isolation, the optimal drawdown strategy can be overlooked. For example, a person who uses their personal savings in order to delay the receipt

U.S. Social Security/Canada Pension Plan benefits can effectively achieve annuitization at a very advantageous rate of return³². The increases in annual payments (8% for U.S. Social Security and 7.2% for Canada Pension Plan per year of deferral beyond the normal retirement age) are inflation-indexed; at 2% inflation, therefore, the nominal rate of increase per year of deferral is 10% in the U.S. and 9.2% in Canada.

It is not surprising that Webb (2009) found that postponing U.S. Social Security benefits is the cheapest means to annuitize and, with only some exceptions, recommended that all Americans should delay claiming their Social Security. Tomlinson (2012) found that “delaying Social Security is even more cost-effective than immediate annuities offered by insurance companies” (pg. 2) if seniors were to use their private savings as bridge income between retirement and taking up Social Security benefits. For example, assuming a conservative 0% rate of return and a 2% inflation rate, the price for a 66 year-old with \$20,000 in Social Security benefits to raise his annual income to \$26,400 in current dollars (32% real increase) would be \$109,000 if he were to delay Social Security to age 70 and draw down his savings over the intervening four years. Tomlinson found this strategy to be cheaper than taking Social Security immediately and targeting the same annual income by purchasing a single premium immediate inflation-linked annuity in the private market with an initial payout of \$6,400.

There are various advantages to using private savings as bridge income to delay Social Security/CPP payments. First, it is more cost effective than buying an annuity in the private market, as was shown in Tomlinson (2012) (this continues to be true given the continuing low interest rate environment at the writing of this paper). A second attractive feature of this strategy is that the benefits are inflation-adjusted. Inflation-indexed annuities are limited in the U.S private market, and nearly non-existent in Canada, despite their general endorsement by analysts (such as Brown (2009b); Doyle and Piggott (2003); Sondergeld and Greenwald (2007) and Webb (2009)). Third, it benefits from the advantages of annuitization, while avoiding the drawbacks of the private market, such as distrust of annuity providers and the complicated process of purchasing an annuity privately (see 2(d) and 2(f) in Section “How Could” under “Annuitization”). Fourth, this strategy could appeal to seniors who have little financial wealth to work with (which makes-up the majority of seniors in Canada and the U.S.³³), who could otherwise find annuitization not worthwhile. Fifth, experts would recommend minimal-risk investments for this drawdown strategy owing to the short time frame of the drawdown period (four years in the U.S. and five years in Canada)³⁴. Risk-averse retirees are therefore relieved of the burden of holding a risky portfolio (which would otherwise be necessary to maximize consumption). Low risk investments are particularly appealing given the recent turbulence in the financial market and the subsequent greater aversion to risk-taking expressed by retirees (Bryck et al., 2009b). Sixth, given the growing importance of the “seniors vote” for electoral success in U.S. and Canada, the accumulated benefits from Social Security/CPP are as risk-free as any conceivable asset.

This drawdown strategy has not been examined in any of the cited literature despite its appeal, which is not surprising since it would score very low using the conventional methodology of measuring exclusively pre-tax income obtainable from retirement savings alone. This is most true under a “probability of ruin” metric given that the strategy aims to deplete assets by age 70.

³² Lars Osberg suggested this drawdown strategy through personal correspondence in May, 2013.

³³ See bullet 2k “*Insufficient personal savings*” in Section *Annuitization*.

³⁴ Ameriks et al. (2001) and Young (2004) both recommended conservative investments for retirees with shorter time frames, and more aggressive investments for longer time frames.

Despite the explanations given by some authors for their pre-tax approach³⁵, the likely explanation behind not incorporating the government's tax and benefit transfer system is its extreme complexity. In the U.S., for example, Kotlikoff (2006) wrote that to compute "Taxation by itself is a factor worthy of a Xeon processor" and "Computing Social Security benefits is another nightmare" (pg. 2). We could not speculate on the impact of incorporating government taxes and benefit provisions on any of the reported conclusions since it depends on the researcher's methodology, the particulars of the individual being modeled (such as his/her other retirement income resources), and the choice of measures (such as lifetime maximum consumption, stability of the annual income streams, or any of the various returns/risks outlined in the above section "Research Methodologies"). The tax/transfer systems in both the U.S. and Canada are, at best, only piecewise linear in pre-tax income. Given the presence of multiple tax brackets, break-evens for a variety of income-tested benefits, deductions, and credits, together with switchovers from one formula to another, one may easily identify twenty or more inflections as income increases. Discontinuities also exist when individuals below particular income levels are eligible for various services, for which they would otherwise have to pay. In some countries, income-tested housing allowances and credits contribute significantly to the total effective marginal tax rates. Further, different sources of retirement income receive very different tax treatments, ranging all the way from being fully ignored for tax and transfer purposes (e.g., Canadian Tax Free Savings Accounts and U.S. Roth IRAs), to being fully taxed for tax and transfer purposes. Moreover, traditional measures of income often fail to include drawdowns of non-taxable assets, although the purchasing power derived from such drawdowns clearly affects consumption and utility. A further complication is that, since families pool resources, consumption is most appropriately measured at the household level, which brings in a different set of tax rules depending on marital status. For instance, certain types of income from pensions and registered savings are eligible for splitting between Canadian spouses, which generate a potentially considerable advantage to household consumption. All of these complications introduce non-negligible challenges to traditional optimization approaches that typically assume continuously differentiable functions.

With the advancements in technology, dynamic microsimulation modeling has become an effective means to properly incorporate pension income and a country's complex tax and benefit transfer system in retirement planning. Examples of such models are ESPlanner in the U.S. (Kotlikoff, 2006) and Ruthen in Canada (Avery and Morrison, 2009). Avery and Morrison's Ruthen model was developed explicitly to address the issue of asset drawdown in retirement. Their 2009 paper reported on the preliminary results generated by this model. To compare alternative drawdown strategies, they did not measure solely the pre-tax benefits generated by the accumulated retirement savings under each strategy, but rather comprehensively examined the major sources of retirement income (employer registered pension plan, government retirement income, registered retirement assets, and non-registered personal savings), and the associated government transfers and taxes (imposed on income, capital gains, sales, and probates). Avery and Morrison did not focus on recommending a particular course of action. Instead, their focus lay in generating a fairly large constellation of consequences associated with choosing one drawdown strategy or another. The objective would be for clients to then choose a strategy that provided the preferred mix of those outcomes, most of them shown not only as point estimates, but also as distributions that reflect the inherent uncertainty in mortality, inflation, and returns to investments. Looking across several strategies that illustrate the scope of the model, they humorously concluded that their results supported the Buddhist proverb, "Life is uncertain; eat dessert first" (pg. 25).

³⁵ For instance, to explain the absence of taxes and government provisions, the common assumption has been that "benefits are taxed as ordinary income; therefore taxes will not change the desirability of voluntary annuitization or systematic withdrawal from a self-managed retirement account" (Dus et al., 2004, pg. 6).

These conclusions did not point towards annuitization, but rather suggested that in a country where the income-tested social programs for seniors are relatively generous, seniors could use an aggressive drawdown strategy for any self-directed assets to maximize the value of income-tested social benefits, particularly those seniors with few private retirement income sources³⁶.

While the transfer system could have a large impact on the optimal drawdown strategy for lower income households, tax impacts (in the form of tax deferral) could similarly be a substantial driver for the upper income households. This will be particularly important for large estates where there are considerable incentives to hold wealth in one form rather than another. For wealthier families, family business holdings that may naturally span multiple generations further complicate optimal retirement financial planning.

While government taxes and transfers are nearly always absent from studies that quantitatively evaluate alternative drawdown strategies, potential future changes to government tax and benefit programs are universally ignored although their significance on the consumption generated from alternative drawdown strategies is conceivably on par with future unknowns that are routinely modeled (interest rates, longevity, and inflation). A few examples from many such changes include the introduction of Roth Individual Retirement Accounts (IRAs) in the U.S. and, in Canada, the recent introduction of Tax Free Savings Accounts (TFSA), the introduction of income splitting for registered income into Canada's tax system, and occasional significant increases to the already inflation-indexed guarantees for Canada's income-tested Guaranteed Income Supplement (GIS) program. Concerns that the U.S. Social Security program is unsustainable are another example of this kind of uncertainty. Analysts understandably ignore these kinds of changes given that they would be very difficult to predict or model.

Another weakness in past literature is the absence of drawdown strategies that react to important life events by making welfare-enhancing adjustments, such as after the death of a spouse or an impending death when health status changes. For example, although research has increasingly begun to examine the impact of health care expenses on the value of annuitization³⁷, no study has yet tested the value of self-managed drawdown strategies that adjust to a person's financial outlook based on his/her new circumstances – such as a drawdown strategy that doubled payouts at the onset of a significant health condition to cover new medical expenses and/or for the individual to enjoy his/her wealth before a foreseeable death. Such a strategy could potentially generate higher lifetime financial welfare than annuitization. Testing a wider range of drawdown strategies would not only provide seniors with better guidance in drawing down their wealth, but it could also shed light on the lack of voluntary annuitization puzzle commonly investigated in academic publications.

Annuities in the Financial Industry and Public Policy

Between annuitization and self-managed drawdown, nearly every study referenced in this paper concluded that annuitization (either partial or complete) was preferable on a “pre-tax and savings-only” income basis, despite their varying methodologies and assumptions. This line of research began with Yaari's 1965 study that ascertained that a risk-averse individual with no bequest motive should fully

³⁶ Other research has similarly found that annuitization is less desirable in the presence of means-tested government transfers (Butler et al., 2011) and a minimum consumption floor (Pashchenko, 2013).

³⁷ For example, Sinclair and Smetters (2004), Ameriks et al. (2011), Pang and Warshawsky (2010), and Peijnenburg et al. (2011a).

annuitize all of his/her savings to maximize his/her utility if the alternative choice were a risk-free asset. The disinclination of individuals to choose this route was referred to as a “long-standing puzzle” by Mitchell et al. (1999) in their study that illustrated the value of annuitizing. Using expected utility as their outcome measure, they found that annuities, despite being actuarially unfair³⁸, were preferable to the drawdown of self-managed wealth and that the greater an individual’s risk aversion, the more appealing annuities became. This was owing to the value of the insurance element of annuitization that guarantees a steady stream of income for life. Although this study did not consider the value of bequests, Davidoff et al. (2005) showed that even if the consumer has a strong bequest motive and his/her desired consumption path does not match that offered by the annuity, it remains optimal to annuitize a large proportion of his/her wealth despite actuarially unfair pricing. Babbel and Merrill (2006) also concluded that the majority of retirement wealth should be annuitized despite a bequest motive and actuarially unfair pricing. Overall, study upon study have all concluded that, at least from a “pre-tax and savings-only” income perspective, annuities are a better value for a rational investor than self-managed strategies and that it is optimal to annuitize a substantial portion of excess wealth. Babbel (2008) reported that, after having reviewed 70 papers since 1999 that examined the tradeoffs between annuities and alternatives, “for most people, lifetime income annuities should comprise from 40% to 80% of their retirement assets under current pricing” (pg. 5).

Voluntary annuitization rates remain very low, despite the large body of research that favors annuities. Consequently, literature has emerged that describes practical means to encourage the public towards annuitization. Brown (2009b) argued that it is an issue of accessibility. For instance, in the U.S., only 20% of 401(k) plans offered the annuitization option to its members, which Brown attributed to the lack of incentive to do so. Moreover, in the U.S., there are issues of legal liability and additional administrative tasks that discourage plan sponsors from offering annuities (Brown and Warshawsky, 2001; Perun, 2004). Overall, Brown (2009b) felt that policymakers and plan sponsors have been very involved in the accumulation phase of retirement wealth, but have neglected the distribution phase.

Mandating annuitization at a particular age is an alternative means to promote annuitization by policymakers, although this approach presents a number of drawbacks, including the opportunity of annuity providers to take advantage of the mandatory purchase requirement, such as by raising prices (Orszag, 2000), and the removal of individual choice, which is particularly harmful for those who would find it suboptimal to annuitize personal savings owing to their other sources of retirement income and/or personal circumstance (see Section “How Could” for a discussions on the potential drawbacks of annuitization that have been put forward by analysts to explain their lack of popularity). Consequently, people could, in fact, be discouraged to save by an annuity mandate since it could reduce their lifetime economic welfare. For voluntary savings, moreover, the saver decides whether to save, when to save and how much to save, and therefore could resent new controls in the drawing down of those voluntary savings imposed by policy makers.

As a final comment on the topic of encouraging annuitization as a part of public policy – a partial substitute for annuitization is to expand federal programs such as Canada Pension Plan and U.S. Social Security. This has not been among the suggested alternatives in the cited literature although these state plans exhibit many of the positive features of annuitization without the drag of self-selection found in

³⁸ They found that the expected present discounted value of the benefits for a single premium life annuity was approximately 20% lower than the expected present discounted value of the premiums for someone from the general population.

the private market. Recent resistance in the U.S. and Canada do not suggest a will for this type of mandated solution among policymakers³⁹.

In other literature aimed at promoting annuities, new annuity products have been proposed that are intended to overcome the major fears towards annuitization:

- *Reversible Annuities* (Wang and Young, 2009): According to a UK survey by Gardner and Wadsworth (2004), the most common reason for not annuitizing is the loss of flexibility. Wang and Young (2009) determined that if the annuity decision was reversible to some extent, then some of the flexibility could be returned to the policyholder if necessary, and this reason for avoiding annuitization would be somewhat alleviated. They proposed a “reversible annuity”, which is an immediate annuity with a surrender value that equals a proportion of the annuity’s purchase value. Such a feature is attractive since the surrender value could be viewed as a contingency fund that somewhat relieves the policyholder from needing to purchase insurance to cover life’s insurable contingencies as well as helps to alleviate the anxiety of uninsurable ones.
- *Extending the risk classes for enhanced/impaired annuities* (Brown and Scahill, 2010): In the Gardner and Wadsworth (2004) survey study, opposition to annuitization was most strongly expressed by those with lower income, education and health, which are characteristics associated with lower life expectancies. Consequently, such individuals would have the least to gain from grouping their longevity risk with others, particularly the mortality of annuity purchasers where the longevity expectation is longer than the average population owing to adverse selection. Gardner and Wadsworth suggested that improving the link between annuity pricing and individual characteristics could lessen the opposition. Brown and Scahill (2010) also came to this conclusion and proposed that the life annuity industry price their enhanced/impaired annuity products by following the risk classification system of the Property/Casualty industry. By classifying consumers to better reflect their longevity risk, individuals with poorer attributes would be able to access an annuity market whose current method of pricing is not appealing to their profiles owing to longevity expectations. In other research, Brunner and Pech (2005) explored a three-period life cycle model involving two periods of retirement. Annuity payouts were allowed to differ in the two periods, and two groups of annuitants were considered – high risk and low risk. The authors found that the two groups of annuitants could be separated using different contract offers, suggesting that by offering appropriate contract options, insurers can address the problem of adverse selection.
- *Life Care Annuities*: This product, proposed by Murtaugh et al. (2001), combines a life annuity with long-term care insurance, thus reducing the aversion to annuities that arises from the fear of not having sufficient wealth to cover this potentially significant expense. Murtaugh et al. further explained that a combination of two such products could reduce the impact of adverse selection as well as the cost of medical underwriting - consequently reducing the cost of providing both the annuity and the insurance features.

In addition, some insurance companies are beginning to offer features on their annuity products to increase their appeal⁴⁰, such as:

- The option for deferred annuity holders to prematurely annuitize without penalty and/or to make penalty-free withdrawals (Babbel, 2008).

³⁹ For instance, the Globe and Mail recently commented that the Canadian federal government’s abandonment of a CPP expansion, which was allegedly due to provincial preferences, was not publicly favored according to polls (Curry, 2011).

⁴⁰ See Shapiro (2010) for an extensive review of existing financial products for retirees, as well as those envisioned for the future.

- The option to increase or decrease the income payments, where the amount and the future date are set in advance (*ibid*).
- The option to make emergency withdrawals from the annuity value (for example, to cover medical expenses) (*ibid*).
- The option for new policyholders to lock in at current interest rates while preserving the ability to benefit from interest rate improvements over a specified period of time (such as 5 years) (referred to as “interest rate protection”) (*ibid*).
- The option to pay for an annuity over time, thus spreading out the underlying interest rate risk (*ibid*).
- The option for annuity holders to defer their payouts (a “deferred annuity”). For instance, having a “DB” investment option within a DC plan by allowing each contribution made to the DC account to be used to buy a guaranteed amount of future annuity income (Brown, 2009a). Another example is when insurance companies offer retiring consumers (e.g., age 65) the option to use some of their wealth to buy a deferred annuity that commences at a later age (e.g., age 85), thus providing a means to partially protect against longevity risk at a reduced price (*ibid*) (as noted in Section “How Could” under “Hybrid Strategies”, this is known as a “longevity insurance” or “deep-deferred” annuity).
- The option to have a minimum withdrawal benefit on variable annuity contracts, so that the annuitant is guaranteed a stream of income while still maintaining a reasonably high level of liquidity and control over his/her investment strategy (Brown, 2009a). Appendix A refers to these as the guaranteed minimum lifetime withdrawal benefit on variable annuities.
- Several features that provide additional income to heirs in case of early death, such as:
 - a guaranteed period of income, regardless of death or survival;
 - death benefits, such as the “capital protected annuity” where the annuity is combined with a decreasing life insurance policy whose death benefit is the difference between the premium paid for the annuity and the annuity payments received up to the time of death (Daykin, 2004).

Lastly, the general promotion of investment-linked annuities by policymakers and plan sponsors was earlier described as a potentially effective means to encourage annuitization, since their hybrid characteristics could provide some middle ground between the two extremes of pure self-management and conventional fixed annuities (Horneff et al., 2007). Similarly, Rashbrooke (2007) discussed the merits and practical issues of introducing annuitized funds into the New Zealand market to encourage annuitization. In this scheme, the participants would pool their investment and longevity risk and the state would provide downward protection as well as share in any excess profit.

Owing to the current aversion to voluntary annuitization that has arisen from the inflexibility and investment limitations of traditional annuities, Daykin (2004) concluded that “the future probably lies in the development of different forms of risk-sharing between pensioners and annuity providers” (*ibid*, pg. 23), that is, future annuity products will likely transfer more flexibility and risk from the provider to the annuitant than traditionally. “Developing new products and new mechanisms for risk-sharing will be the challenge of the next decade” (*ibid*). As people generally exhibit a low level of financial literacy, however, new product developments will have to balance the apparent demand for products that better fit the personal circumstances of consumers and the need for simplicity to avoid consumer confusion (Brown, 2008). The financial industry could, furthermore, face some difficulty in overcoming a general resistance to their advice and products, as empirical evidence of current retirees suggests that there is a mistrust of professionals and a sentiment that retirees themselves are better able to manage their finances (Greenwald et al., 2006). Government-mandated solutions could also be met with resistance. Like the financial industry, government could also benefit monetarily through higher annuitization rates by the reduction in payouts of social income-tested senior programs (although this would need to be balanced against the longitudinal impact on income and sales taxes). Given the consistent government support in

many countries for greater responsibility and greater choice on the part of citizens, mandatory schemes would likely require strong evidence before they could be adopted.

General Advice for Retirement Savings Drawdown to the Individual

Many of the articles reviewed in this report offer constructive suggestions for retirement savings drawdowns. We conclude that the most important consideration when deciding how to draw down retirement savings is a household's other financial retirement resources. We next break these out in terms of (1) individual and employment-related sources and (2) the country of residence's tax and benefit transfer system.

(1) Individual and employment-related sources

The National Academy of Science (2005) described retirement income as a three-legged stool involving Social Security, employer pensions, and individual savings. One of the largest retirement challenges for workers is that they do not understand their retirement income sources (Sondergeld and Greenwald, 2007); thus, it is advisable that they periodically take an inventory of their financial resources and build a retirement plan that integrates these various sources. The U.S. Department of Labor (2010) offered concrete guidance on how individuals can do this, providing worksheets to assist in determining resources and needs. With this information, households can develop a retirement plan that comprehensively includes all of their assets. For instance, a potentially valuable alternative to annuitization that emerges when taking an integrated approach to retirement financial planning is to use personal savings as bridge income to delay claiming Social Security (see Section "How SHOULD" under "Discussion on Research Methodologies").

Using an integrated perspective, debt also becomes a component of an individual's drawdown strategy. Experts often advise that debt reduction should take priority over retirement savings (such as Hamilton in Chevreau (2008)). Retirees could find that their financial well-being improves if they use financial savings to first eliminate debt (particularly high-interest debt) and use the remainder as a source of consumption.

Brown (2009b) and Webb (2009) offered advice on the annuitization decision from an integrated perspective, suggesting a household should have a secure income stream to cover its lifetime daily expenses. If daily expenses are not met by income from guaranteed income (individual private annuity income, Social Security payments, income from DB pension plans⁴¹ and any other guaranteed lifetime income), then the household should make-up the majority of the shortfall by purchasing inflation-protected annuities. Sondergeld and Greenwald (2007) similarly emphasized that inflation must be accounted for; if a guaranteed income source does not keep up with inflation, therefore self-managed savings should be set aside to make up the anticipated shortfall for each future year. Further, married workers should also find out if their guaranteed income sources continue after their death, and compensate for those that do not (by purchasing life insurance, for example) (*ibid*). Babbel and Merrill (2006) advised that any supplemental private annuity should come from a high-grade provider to avoid the possibility of default.

⁴¹ Regarding employer DB plan benefits, Sondergeld and Greenwald (2007) advised retirees that "(w)hen retiring from a job with a DB pension plan, seriously consider the consequences of taking a lump sum (if offered) instead of a lifetime income from the pension plan" (pg.16).

In addition to having sufficient income to cover basic needs, another important consideration is potential catastrophic expenses – such as a divorce or the onset of a long-term health condition. The number one concern among surveyed retirees in the U.S. was future health care costs and the need for long-term care (Greenwald et al., 2006). Unlike investment decisions and general spending, retirees viewed health and the associated costs as beyond their control, particularly at advanced ages. Its relative importance against other retirement risks also arose from the potential magnitude of the cost (particularly in the U.S.). Despite being a major source of anxiety, most of the respondents had not purchased long-term care insurance because they felt that it was too expensive. Sondergeld and Greenwald (2007) explained that few retirees are able to self-insure against the cost of long-term care, and they consequently advised retirees not to delay in investigating the purchase of long-term care insurance, since ‘premiums for new policies increase quickly with age and some consumers may become uninsurable if they wait to apply for long-term care insurance’ (*ibid*, pg. 14). Note, however, that long-term care contracts depend critically on the contracted supplier given that, when people need the care, they will unlikely be able to enforce their contractual rights. Since divorce or the need for specialized medical care could require that the retiree vacate his/her home, Skinner (2006) suggested that owning a home that could be sold is a good hedge against such risks, although Redfoot noted that “planning to sell the house at a time of future need is quite risky in a world when home values go up and down and where it can take a long time to sell a house” (Siegel, 2011). Empirical evidence suggests that retirees do, in fact, treat housing equity as precautionary savings to finance large, unplanned expenses such as health needs (Venti and Wise, 2004; Poterba et al., 2011b). Pang and Warshawsky (2010) suggested that an annuity could substitute for long-term care insurance since its stable income stream would help to cover the ongoing costs of care, particularly during advanced ages when chronic health conditions are more likely and wealth would have otherwise become depleted.

(2) The country of residence’s tax and benefit transfer system

When quantitatively comparing alternative drawdown strategies, researchers have habitually focused on the before-tax benefits produced by each strategy, neglecting the important role played by the country’s tax and benefit transfer systems. If the government’s social support programs for seniors are quite generous and the income taxation depends on source, then their neglect could produce misleading results. In Canada, there are significant income-tested social benefits such as Old Age Security (OAS) and Guaranteed Income Supplement (GIS) and, while some sources of income for seniors are taxed as ordinary income, others are not⁴². Consequently, the inclusion of Canadian tax and benefit transfer systems is likely to have an important effect on the overall pattern of total income produced by alternative drawdown strategies, as discussed at the beginning of this section. It is quite possible that the widespread support for annuitization among researchers would be measurably altered if government taxes and transfers were taken into account. As was seen in the Avery and Morrison (2009) results, it could be optimal for some Canadians to consume their individual savings during their disability-free life expectancy and rely on government transfers at advanced ages (see Section “How SHOULD” under “Discussion on Research Methodologies”).

⁴² For instance, while OAS benefits are subject to income tax, GIS benefits are not. In addition, registered wealth (RRSPs and the RRIFs that replace them for older retirees) and other wealth (Tax-Free Savings Accounts) are taxed differently at payout since the former has tax-deductible contributions while the latter does not. In the U.S., a similar distinction exists for Roth IRAs and “standard” IRAs.

As future medical and long-term care expenses are a dominant concern for the aged, the medical coverage afforded by government is a further important consideration when deciding how much money should be set aside to either self-insure against future medical expenses or to cover any necessary health insurance premiums (Sinclair and Smetters, 2004).

Overall, it is important that workers and retirees understand the tax and benefit provisions for seniors within the state and local governments when deciding their drawdown strategy, while also keeping in mind that these provisions can change.

Other considerations

When determining the best drawdown strategy, the following factors should also be considered if a person is contemplating self-managing some or all of his/her retirement assets:

- *Budgeting:* None of the retirees surveyed in the Greenwald et al. (2006) study had a systematic drawdown strategy, but rather withdrew money on an “as needed” basis – taking it “day by day”. Consequently, many remarked that they were spending more in retirement than they did while working. Although higher post-retirement spending is unlikely to extend to the general population⁴³, the overall attitude of the respondents suggests that retirees generally do not follow a defined drawdown strategy or any long-term financial plan. As the size of self-managed assets grows as a proportion of retirement income sources, such a laissez-faire attitude will likely jeopardize financial security. Choosing an appropriate drawdown strategy with annual limits, then making suitable adjustments when necessary, should lead to fewer unwelcome surprises during the latter years of retirement.
- *Government rules and regulations:* Clearly, individuals need to be aware of the government rules and regulations when selecting a drawdown strategy. In countries such as Germany, Chile, Canada, and formerly in the UK, withdrawal limitations and/or switching to annuitization at a specified age are mandatory for particular retirement accounts (generally those that receive tax incentives from the government during the accumulation phase). Daykin, the former UK Government Actuary (1989 to 2007), explained that governments prescribe a minimum and maximum withdrawal rate to satisfy two competing public needs – (1) to collect tax on payout income as quickly as possible and (2) to avoid having individuals spend their savings too quickly and consequently rely on social welfare programs (Daykin, 2004). For example, Canadian rules for tax-sheltered RRSP/RRIF retirement savings require age-specific minimum withdrawals (starting at age 71). Non-registered savings, and the new Tax Free Savings Accounts, are not subject to such minimum withdrawals.
- *Bequest motive:* Regardless of the risk and return measured tradeoffs between annuitization and self-management, households who have a strong bequest motive will likely choose not to fully annuitize their retirement savings so that they are able to leave a bequest. Although it is true that a conservative self-managed strategy will likely result in a larger bequest from a person’s estate than one that is more aggressive, it will also likely produce lower annual income, lower annual taxes, different levels of government transfers, and more management fees to fund managers (Avery and Morrison, 2009).

⁴³ In fact, empirical evidence suggests quite the opposite – that spending drops significantly after retirement. This phenomenon is referred to as the “retirement consumption puzzle”. For studies that examine the possible causes behind this trend, see Brzozowski and Lu (2010) in Canada and Aguiar and Hurst (2005) and Hurd and Rohwedder (2005) in the U.S.

Among the variable drawdown strategies listed in Section “How Could” under “Self-Managed Drawdown Strategies”, #3 (iii) (spend remaining wealth over the remaining years until maximum age in the mortality table is reached) and #6 (spending the interest and dividends, while preserving the capital) are likely to deliver the largest average bequests. Rather than exclusively using a self-managed approach, however, there are alternative options for individuals with a strong bequest motive that include annuitization, such as:

- a) Partially annuitize their wealth and use the remaining wealth to purchase life insurance coverage (insurance premiums could, however, become quite substantial at advanced ages).
- b) Purchase an annuity with a guaranteed period (the heirs will continue to receive the annuity payments after the death of the annuitant for the duration of the guaranteed period). With this option, the size of the bequest will depend on when the annuitant dies and would be zero if death is after the guaranteed period. Further, the gain from the mortality premium is forfeited during the guaranteed period.
- c) Partially annuitize their wealth and use the remaining wealth as a bequest to heirs (Davidoff et al., 2005).

The appeal of (a) and (c) alternatives is that the size of the bequest is known and, in the latter case, the timing can also be predetermined (that is, it can be given before death if desired). Davidoff et al. (2005) argued that both the timing and size of the bequest are uncertain in a self-managed strategy. Brown (2008) reasoned that if an individual is risk averse regarding the size of bequest, then annuitization is important in ensuring that the desired amount is available upon his/her death. Further, the recipients would benefit from knowing the size and possibly timing of the bequest in their own financial planning and budgeting (Brown, 2009a).

At least in principle, however, an organized self-managing retiree could ensure the amount and/or timing of a bequest by doing any of the above (a, b, or c) without purchasing an annuity - for instance, the retiree could purchase life insurance and self-manage the remaining wealth, just as he/she could choose the time and amount of the bequest at any time while still living by setting aside the desired funds in a risk-free account. Note that such planning would need to take account of inflation if the real value of the bequest is an issue, and of various tax impacts associated with the returns to the funds set aside.

- *The importance of the investment strategy:* The retirement period is a significant portion of the average individual’s life, and its average length is growing with longevity improvements as well as the trend towards earlier retirement (Brown, 2008); consequently, the long-term portfolio choice during retirement can make a big difference to the success of a drawdown strategy. In fact, Blake et al. (2003) observed that the individual’s welfare was more affected by the investment strategy than the drawdown strategy among those strategies that were tested.

Ameriks et al. (2001) ascertained that, when analyzing a fixed income drawdown strategy (inflation-adjusted), an aggressive portfolio heavily weighted in stocks almost always outperformed the alternative portfolios; these conclusions were supported both by using both Monte Carlo simulation and analyzing “what would have happened in the past?” from empirical data. The less stock-heavy portfolio was less risky, which could be more attractive for those wishing to consume their wealth over a short duration⁴⁴. For longer time frames that are generally more suited to retirement durations, however, the conservative portfolio generated levels of income that were comparatively quite low and, in the rare cases where it did outperform the aggressive portfolio, the margin was small

⁴⁴ Similarly, Young (2004) found that if a retiree anticipates a short future life expectancy, the optimal investment strategy to minimize the risk of outliving wealth is to invest conservatively.

(Ameriks et al., 2001). Regardless of the portfolio composition, Sondergeld and Greenwald (2007) advised that the retiree should not attempt to time the market and make frequent transfers between assets.

Because the outcomes in Ameriks et al. (2001) from both the historical analysis and the simulation models were shaped by the historical financial data, the authors warned that there “is no guarantee that this pattern will repeat itself into the future” (*ibid*, pg. 4). Siegel (2005) confirmed this warning, projecting that the future equity premium will drop from its historical average of 6% to 2-3%.

- *Attitude towards risk with regards to investment strategy:* If a retiree is willing to accept potentially major fluctuations in the value of his/her financial assets over time, it is generally advised that he/she invests more aggressively and take advantage of an equity-heavy portfolio since equities, which have historically almost always outperformed bonds over the long term (see Blake et al. (2003) for a discussion). The greater a person’s appetite for risk, the more it is optimal (from a quantitative evaluation of utility) to increase his/her portfolio’s exposure to equities (Blake et al., 2003; Horneff et al., 2008). Even very risk-averse individuals should hold 40% of their assets in equities (Horneff et al., 2008). (See the previous bullet for precautions regarding findings that rely on historical equity premium data.)
- *Attitude towards risk with regards to drawdown strategy:* Risk aversion affects the optimal drawdown strategy, since each strategy will be more or less likely to produce a stable lifetime income. For instance, according to the results in Horneff et al. (2008), variable drawdown strategy #3 (i) in Section “How Could” under “Self-Managed Drawdown Strategies” (spend remaining wealth over life expectancy) was appealing to low and medium levels of risk aversion, but not so appealing for high levels of risk aversion. Complete and immediate annuitization was the most appealing only for the very risk averse retiree. The least desirable strategies⁴⁵ across all risk levels were the fixed income strategy #1 (iii) and variable strategy #3 (iii) (spend remaining wealth over maximum duration of the plan). The generally most desirable was a fixed fraction rule (strategy #5 (i)).
- *Guaranteed income from other sources with regard to investment strategy:* A household with adequate secure income from its social security, employer defined benefit plan and annuitized wealth will have more flexibility in making drawdown strategy choices and in choosing its investment strategy. For instance, if income from other sources is sufficient to support the household’s living standards, and particularly if this income is indexed against inflation (e.g., U.S. Social Security benefits, Canada Pension Plan benefits, and Old Age Security benefits), then households are more at liberty to increase their exposure to riskier investments and benefit from the potentially superior returns without fear of reducing their standard of living. Further, eligibility for income-tested benefits may ensure that the government sector shares the downside risks associated with more aggressive strategies.
- *Conventional financial planning advice:* Sondergeld and Greenwald (2007) recommended that retirees seek out qualified professional advice when planning for retirement. There is, however, criticism of financial advisors in the literature. The recent report by the SOA (Iannicola and Parker, 2010) noted some of the difficulties that non-affluent families may have in obtaining financial advice that is unbiased and free from conflicts of interest. Further, Kotlikoff (2006) provided substantial insight into the shortcomings and negative outcomes of conventional financial planning when it comes to savings, insurance and investment advice. Kotlikoff explained that the main issue is that financial planners do not base their advice on sound economic theory, but give simplified advice to

⁴⁵ Horneff et al. (2008) did not, however, examine all of the strategies that we have listed in Section “How Could” under “Self-Managed Drawdown Strategies”.

help speed clients through the planning process. According to economic theory, households strive to maintain a stable standard of living. Kotlikoff explained that a primary mistake of financial planners is that they ask their clients to set their own consumption goals in retirement, rather than help them determine the ideal consumption given their sources of wealth and individual preferences. Consequently, their advice leads to unwanted changes in living standards (consumption disruption), which is in contradiction to general economic theory that promotes consumption smoothing over an individual's lifetime. There are several other negative repercussions to this line of advice. The more an individual targets to consume, the more risk s/he would need to take on in his/her investment strategy to obtain a high enough return to support that consumption (Young, 2004). For instance, women generally have greater longevity than men and financial advisors have traditionally promoted risky investments to help them sustain their potentially long life (Babbel, 2008). The higher the risk, however, the more likely the individual will outlive his/her wealth since greater investment volatility increases the probability of not reaching return targets.

Financial advisors make the further mistake of assuming that individuals will not adjust their spending regardless of the performance of their investments (Kotlikoff, 2006). This assumption is unrealistic and dangerous to financial welfare. Consumption smoothing requires that individuals make the necessary adjustments so that wealth does not run out. Financial advisors should educate their clients as to the types of spending adjustments that should be made, both in terms of level and timing (*ibid*). Otherwise, clients could be led to believe that "adjusting their portfolios rather than their lifestyles is the prudent response to low returns" (*ibid*, pg. 5). Realizing the financial planning ignorance of the general public, Kotlikoff (2006) feared that conventional financial planning impairs the financial health of individuals rather than help to improve it.

Tomlinson explained that it is not necessary to build withdrawal strategies that work on autopilot. He recommended that the financial planner and client regularly come together and reset plans (typically once a year). Since strategies that smooth consumption are likely preferable, adjustments should not be too severe⁴⁶.

- *Necessary adjustments*: When asked how they intend to adjust their spending when faced with inflation, increased health expenses and low market performance, surveyed retirees typically responded "I'll just know" and were unable to give any explanation of their meaning (Greenwald et al., 2006). Sound retirement planning includes the consideration of when and how to adjust spending to avoid a severe reduction in later-life lifestyle, rather than relying solely on intuition. For instance, Webb (2009) explained that drawdown strategies should respond to asset performance (that is, variable strategies are recommended), so that households do not continue to consume at the same pace if their funds are severely reduced. Because of this property, variable strategies have been found to reduce the risk of lifetime ruin compared to fixed strategies (Blake et al., 2003). Another approach would be to use a fixed strategy, but to make appropriate adjustments when necessary (as discussed in previous bullet).
- *Inflation*: The corrosive effect of inflation over a long retirement can have a severe impact on the buying power of a fixed income that is level in nominal terms (see the list of annuity considerations below for a lengthier discussion). Consequently, retirees need to account for increasingly higher nominal withdrawals in their drawdown strategy if they wish to maintain the same purchasing power. The importance of inflation protection depends on the fraction of the retirement income that the withdrawals are intended to provide as compared to other sources of inflation-indexed benefits (for instance, government benefits such as U.S. Social Security or Canada Pension Plan and Old Age

⁴⁶ Proposed by Joseph Tomlinson via personal correspondence in October, 2012.

Security pension benefits are indexed to inflation, and many DB employer pension entitlements are fully or partially indexed to inflation).

- *Investment expenses*: Investment expenses can have a severe impact on net income. For instance, most studies that support a fixed 4% withdrawal rate (strategy #2 (i)) are based on pre-expense withdrawals. Consequently, 2% annual investment expenses would effectively reduce the annual benefit by 50%, illustrating the importance of considering investment fees when choosing a strategy.
- *Longevity expectations*: Someone in good health with an active lifestyle could anticipate lower medical expenses during his/her earlier retirement - but s/he is also more likely to live longer and would therefore need to spread his/her resources over a longer period of time. Advanced age is, moreover, likely to bring with it very high medical expenses, pricey drugs, the need for long-term support, and reduced purchasing power owing to long-term exposure to inflation (especially in the U.S.) (Sondergeld and Greenwald, 2007). In addition to current health, gender and economic welfare are both contributing factors to lifetime expectations. For example, the future life expectancy of a healthy, high-income 70-year-old woman is 17 years, while that for a sick, low-income 70-year-old male is just above a third of this (6 years) (DeNardi et al., 2006). Owing to their generally longer longevity, women are consequently more likely to outlive their wealth than men (Milevsky and Robinson, 2000; Young, 2004). It is also suggested, therefore, that women need to be particularly prudent in their financial planning since they have a greater likelihood of widowhood, poverty, and nursing home care, while also tending to have a lower threshold for risk (Babbel, 2008).

It is important to note, however, that life expectancy statistics on their own are a poor tool in retirement planning since about half of the population will live beyond this period, some for decades. Life expectancy estimates have also been on the low side for some time, as longevity improvements have outpaced predictions in most developed countries. To protect against financial shortfalls in later life and continue to self-manage retirement wealth, one option is to purchase longevity insurance. Most published research, however, has recommend annuitization (based on a “pre-tax and savings-only” perspective).

- *Early retirement*: Retiring early clearly extends the period over which retirement financial resources will need to be spread.
- *Changes in Marital status*: Many married retirees do not plan for the maintenance of one spouse after the death of the other (Sondergeld and Greenwald, 2007). Sondergeld and Greenwald explained that “If you are married, understand that the chance of you and/or your spouse living long is greater than your individual chances. For example, for couples reaching age 65 there is nearly a 50 percent chance that at least one of them (and possibly both) will still be alive at age 90” (pg. 12). An unexpected decline in economic welfare (and possibly even poverty) after the death of a spouse comes, moreover, at a time when the surviving spouse is also more inclined towards depression and even suicide (SOA, 2008). Sondergeld and Greenwald recommended either a joint-life-annuity or the purchase of life insurance to protect the surviving spouse. This advice should be taken in light of any survivor benefit entitlements from employer DB pension plans and Social Security. Lastly, proper wills and estate planning are essential (SOA, 2008).

In retirement, it should also be recognized that divorce is not uncommon – in fact, unlike the decline in U.S. population-wide divorce rates over the past ten years, divorce rates have more than doubled between 1990 and 2010 for Americans aged 50 and above (from 4.87% to 10.05%) (Brown and Lin, 2012). “Marriage and divorce can affect benefit entitlement under public and private plans. Some of these effects may not be well understood... Divorce can create major financial problems for either party... Many women are alone in retirement” (SOA, 2008, pg. 10).

- *Changing needs in retirement*: “When saving and planning for retirement, employees (and, too often, their financial advisors) act as though the employee’s needs and expenses will remain constant

throughout retirement. Nothing could be further from the truth.” (Mills and Young, 2004, pg. 43). These changing needs are often driven by death/divorce of a spouse, health care costs, loss of the ability to live independently, and change in housing needs (SOA, 2008). SOA also explained that unforeseen needs of family members, such as to fund higher education and assistance in financial setbacks, should also be recognized in retirement planning in both the accumulation and drawdown phases.

- *Informal support network*: Expectations of financial and non-financial support from family/friends and other personal circumstances also plays a role in determining the best drawdown strategy. The opportunity to obtain financial support is clearly an important variable, since it could mean that the retiree can hold a smaller contingency reserve or private insurance to protect against adverse financial events. Non-financial support, moreover, in the form of advice, care and concern should not be overlooked, most particularly at advanced ages, since such care can provide important services that a retiree might otherwise have to pay for or do without⁴⁷. In addition, sincere advice and concern, as well as someone to advocate for a senior’s best interests, can become invaluable as there are many risks to balance and individual responsibility when self-managing wealth.
- *Fraud*: Since mental health, as well as physical health, often deteriorates with age, there is an increasingly greater risk of making bad judgments after retirement, including being misled by unscrupulous advisors⁴⁸. “With retirees typically unable to replenish assets lost through fraud because of limited earnings potential, the impact of fraud can be particularly devastating” (quoting Steve Cooperstein in Siegel (2011)). If self-management is chosen, the retiree should form some type of plan regarding whom s/he will trust. Retirees should proactively convey their general wishes to that individual.

In addition to many of the items listed above, a person deciding to annuitize his/her wealth or part thereof should consider the following factors:

- *Inflation-adjustment*: The major advantage of annuitization is the security of a guaranteed income at advanced ages. If the annuity is not inflation-indexed, however, income security becomes severely compromised by the cumulative impact of inflation. Greenwald et al. (2006) reported that surveyed retirees who are limited by a fixed income do indeed feel the acute effects of inflation. This is not surprising – for instance, the average inflation in the U.S. has been 3% over the past 80 years. Based on this rate, the purchasing power of a fixed income would halve in less than 24 years (Brown, 2009b).

Unfortunately, the inflation-indexed annuity market is less mature than the nominal annuity market in the U.S. and nearly nonexistent in Canada. Until it develops, an alternative is to purchase an escalating annuity whose payments increase each year at a specified rate (such as 3%) (*ibid*). An escalating annuity is not a perfect solution to maintain the real value of annual income since inflation will likely fluctuate around the rate of escalation and the resultant real income will vary from year to year. Moreover, an escalation rate that is mismatched with the long-term realized inflation returns will inadvertently backload or frontload the annuity’s income pattern. An escalating annuity could also possess additionally high transaction costs owing to the possible adverse selection by product type (*ibid*).

⁴⁷ In Canada, for example, informal caregivers were responsible for 70% of the hours of support provided to elders with a long-term health problem (Lafrenière et al., 2003).

⁴⁸ Information on the vulnerability of seniors to fraud and scams can be found in the SOA report by Iannicola and Parker (2010), a report by the Canadian Task Force on Financial Literacy (Government of Canada, 2010) and Fishman (2010).

A variable annuity is another option to protect against inflation (Milevsky, 2002). To best hedge against inflation, the annuitant should choose a low Anticipated Interest Rate (AIR)⁴⁹ so that there is more potential for payments to increase in the future and keep pace with inflation, although the initial payment is consequently lower (*ibid*).

- *When to annuitize:* Knowing the optimal time to annuitize has been an important focus of many researchers (e.g., Blake et al. (2003); Stabile (2003); Milevsky et al. (2006), Milevsky and Young (2002), Young (2004), and Gerrard, Haberman and Vigna (2006)). This line of study stems from the concept that annuities become increasingly attractive with age owing to the mortality premium. Consequently, self-managed drawdown strategies could be more suited to younger retirees and annuitization delayed to older ages⁵⁰. See Section “How Could” under “Hybrid Strategies” for a fuller discussion on delayed annuitization.
- *Attitude towards risk:* A person’s level of risk aversion affects the optimal proportion of wealth that is converted to annuities, as well as the optimal age to annuitize – the more risk averse should annuitize a greater proportion of his/her wealth and begin the process at a younger age than the less risk averse (Blake et al., 2003; Babbel and Merrill, 2006; Horneff et al., 2008; Milevsky and Young, 2007). In addition, attitudes towards risk may evolve with age.
- *Uninsured financial risks:* As explained in Section “How COULD” under “Hybrid Strategies”, there are many advantages to holding a life annuity in combination with self-managed assets, including the ability to retain sufficient liquid wealth to cover uninsured financial risks.
- *Choice of annuity provider:* Investors should be conscious of potential insurer insolvency, particularly if the state does not provide full protection as is the case in the U.S. (Babbel, 2008). If the annuitized income is intended to carry the important task of supporting consumption throughout retirement, it is most prudent to choose only a high quality annuity provider (*ibid*). Further, the purchaser should also be aware that expense ratios can vary widely from provider to provider.

Conclusion

Much of the past research on the topic of retirement savings drawdown has explored how retirees “should” think when drawing down their savings, but the question of how retirees “do” think, and their spectrum of preferences and trade-offs, remains largely unanswered. With the shift of pension plan provisions towards individual savings accounts⁵¹ where the retiree is responsible to carry the drawdown decisions and associated risks, well-studied public policies and evidence-based advice from financial advisors that recognize the true preferences of the retirees themselves are vital.

When quantitatively comparing alternative drawdown strategies for the purpose of recommending one strategy over another, a key area for future development in this line of research would be for analysts to comprehensively include all retirement income sources – owner occupied housing, pensions, debt, and the country’s tax and benefit transfer system - rather than solely the before-tax income generated by the individual’s savings alone. For example, if government taxes and transfers were routinely incorporated

⁴⁹ AIR is “the benchmark investment return that must be earned by the underlying portfolio before payments can actually increase” (Milevsky, 2002, pg. 25). If the AIR is ‘i’ and the experience rate of return is ‘r’ then the payment will increase by the ratio $(1+r)/(1+i)$.

⁵⁰ Dus et al. (2004) found that by choosing to self-manage their retirement savings, young retirees reduced their expected shortfall risk and improved their expected payouts.

⁵¹ See Broadbent et al. (2006).

into analysis, the widespread support for annuitization among researchers could be measurably altered. By way of illustration, income-tested government benefits for seniors would undoubtedly improve the standing of any self-managed drawdown strategy since the downside risk is mitigated (as was seen in Avery and Morrison (2009), Butler et al. (2011) and Pashchenko (2013)).

Further, an important and natural extension of drawdown research is to incorporate the accumulation stage since strategies in building up retirement savings will significantly affect the nature of the portfolio that exists at the point of retirement, e.g., whether it is registered, the extent to which the portfolio contains unrealized capital gains, and the accessibility of the assets in retirement. Ultimately, research can increasingly uncover the lifetime tradeoffs involved in saving for retirement as well as spending down those savings. Preliminary investigations along these lines in Avery and Morrison (2011) showed that the real internal rates of return on voluntary retirement savings can be surprisingly low, much lower than the real return on the underlying investments, and that the corresponding real internal rates of return to the government are considerably higher.

Third, researchers have been relatively limited in the types of drawdown strategies examined. Future work could include strategies that are not only linked to investment performance, but also adjust payouts after critical life events. For example, a drawdown strategy that adjusts to longevity expectations after the onset of a chronic health condition could prove more valuable to an individual from a lifetime consumption framework than (the generally preferred) annuitization. Another promising strategy is to use savings as bridge income to delay the take-up of Social Security benefits.

A fourth useful future line of research would be targeted at bridging the gap between academia, industry and the individual. Some previous studies have been explicitly intended for this purpose (such as WISER (2001, 2002) and Webb (2009)). There is a significant amount of valuable research in this field and potentially much to be gained by financial advisors, policy-makers, and plan sponsor advisors. Unfortunately, even when the information is properly conveyed, the interests of various stakeholders could create difficulty during the implementation stage. For instance, Brown et al. (2008) proposed that most retirees view their retirement savings as a continuing investment rather than a source of consumption; therefore, to improve the financial welfare of retirees, annuity providers should attempt to change the perspectives of their clients. He postulated that one reason that annuity providers currently do not do this is for fear that it would discourage demand for the company's other non-life-contingent products. Similarly, Tomlinson (2011) suggested that financial advisors are reluctant to promote annuities as they would lose future access to the funds and rollover commissions.

Academic researchers have been unable to fully explain the near-universal lack of annuitization using the prevailing economic models. The attitudes of the retirees in the SOA, LIMRA and InFre focus groups cited throughout this paper are a clear example of the conflict between the thought processes of real-life retirees when managing their financial security and the assumptions underlying the economic models developed by researchers. An interesting fifth area of future work would be to continue work like Brown et al. (2008) in conducting surveys that aim to unearth the driving motivations behind drawdown behavior of current retirees. Any uncovered individual preferences could be used to improve the standard economic models in explaining how individuals value annuities and the various self-managed drawdown strategies. Rather than be general and nonspecific, such surveys should be well designed and focused on proving or disproving a hypothesis. In addition, it would be beneficial to survey individuals who have entered their drawdown phase so to obtain information on the motivation behind actual actions, rather than the motivation of intended actions, since these two could be quite different.

With the growing scarcity of annuitized retirement income, understanding drawdown decision-making is becoming increasingly relevant since foresight on how the growing number of retirees will manage their individual accounts, as well as understanding their motivations, will serve as a useful tool toward setting public policies, creating public education services, creating new insurance products, etc. For instance, if the lack of annuitization is driven by misinformation and other behavioral biases rather than rational and informed insight, governments could potentially improve the financial welfare of seniors by initiating programs that provide financial education or setting policies that encourage annuitization (see Brown (2009a)). If, however, an avoidance of annuitization proves to be driven by fundamental preferences and rational conclusions on the part of retirees, then the findings might suggest new drawdown strategies and financial products that would better meet the needs of retirees.

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Appendix A

The major types of annuity products are:

- Fixed Annuity: The payments are fixed in nominal terms.
- Real Annuity: The payments are fixed in real terms; that is, the payments are indexed to inflation.
- Graded Annuity: The payments increase at a pre-specified rate.
- Joint and Last Survivor Annuity: The payments are made to the annuitant and his/her survivor.
- Term Certain Annuity: The payments are guaranteed for a pre-specified term, regardless of death or survival.
- Deferred Annuity: The payments do not begin immediately, but on a pre-specified date in the future. When the payout is deferred until an advanced age (such as beyond age 80), it is also known as a longevity insurance annuity (or advanced-life delayed annuity).
- Participating Annuity (U.S.) / With-Profits Annuity (UK): The payments are guaranteed to meet principal plus minimum investment return, and potentially supplemented with dividends/bonuses that are linked with the insurance company's mortality experience, investment performance and expenses (Daykin, 2004; Mitchell et al., 1999).
- Unit-Linked Annuity (UK): The payments are linked to the underlying asset portfolio, but the insurer carries the mortality risk (Daykin, 2004).
- Variable Annuity (U.S.): The basic VA policy is a savings vehicle with an annuity option at maturity that is rarely exercised. More recent developments in variable annuities have seen, however, the introduction of annuity-type benefits, such as the guaranteed minimum lifetime withdrawal benefit that allows the policyholder to withdraw a proportion of the starting fund value for their lifetime. The policyholder takes some investment risk, but once the fund is depleted by withdrawals, the insurer is left with the remaining life payments. The insurer carries a combination of investment and longevity risk.
- Annuitized Fund: Annuitants carry their own investment risk; they share, however, in the mortality experience of their cohort in that they profit if mortality is higher than expected and lose if mortality is lower than expected. As the size of the cohort dwindles at advanced ages, the process becomes unstable and the survivors need to purchase a life annuity with the remaining balance of their fund (Daykin, 2004).
- Enhanced/Impaired Life Annuities: The price of the annuity is reduced due to a diagnosed medical condition that is sufficiently severe to alter the underlying mortality assumptions.