

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

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Abstract

How DO Retirees Draw Down their Financial Savings? How COULD Retirees Draw Down their Financial Savings? How SHOULD Retirees Draw Down their Financial Savings? This paper examines these three questions by reviewing literature that identifies and evaluates the tradeoffs among annuitization and self-managed drawdown strategies. In doing so, we provide not only the perspective of the individual, but also other stakeholders, such as family, government and financial institutions.

With over one hundred papers read specifically for this literature review, we have identified three significant conceptual/methodological weaknesses in the relatively recent surge of academic research on this topic. First, the types of drawdown strategies examined and recommended by analysts have been relatively limited and do not include those that respond to the individual's personal circumstances – most notably health. Second, nearly all previously published studies have ignored the potentially significant impact of government taxes and transfers when quantitatively evaluating alternative drawdown strategies. Lastly, there is a significant gap between the behavior implied by economic models and those of real-life individuals, particularly when it comes to voluntary annuitization. This last weakness is well acknowledged among researchers and substantial work has been done to uncover the missing pieces. The second weakness is very slowly being addressed in recently emerging literature. As of yet, however, no researcher has addressed the first weakness.

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 the optimal annual level of retirement wealth consumption given an individual's preferences; the interests of actuaries lie in the design and marketing of annuity contracts, and a public policy analyst might be interested in the effect of government policies on drawdown behavior. The objective of this paper is to review the existing literature on this multi-faceted topic so as to draw clear insight on the best approach to drawing down individual retirement savings, using both the individual's perspective as well as 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). Despite the appeal of flexibility and liquidity, the primary drawback of lump sum distributions is that “they fail to provide a formal mechanism by which individuals can insure against the risk of outliving their resources” (*ibid*, pg. 1). In addition, the management of post-retirement financial risks becomes the full responsibility of a worker who chooses a lump sum, such as the risk of high inflation, poor investment performance, large unplanned expenses (particularly those arising from declining health), consuming overly conservatively and 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 these risks over the span of anywhere from 10 to 40 years of retirement. A very elderly individual will likely be less and less able to manage these risks and avoid being misled by unscrupulous advisors. Many of these risks are assumed, 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, if significant numbers of retirees draw down their wealth during the earlier years of retirement when they are better able to enjoy it, and are consequently unable to sustain themselves during the later years of retirement, the hardship will not be limited to the individual since society will end up sharing the risks that the retirees were unable to manage. A rise in poverty rates and financial pressure on means-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). Consequently, this paper considers the perspectives of the various major stakeholders affected by strategies, including the retiring individuals, family, heirs, financial industry, and the government sector. Our review will include attention to potential moral hazard issues that could arise from the conflicting objectives of the several relevant actors.

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” 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 decumulation has been small relative to the emphasis that employers, policymakers, consulting professionals, financial advisors and academics have, for years, placed on the accumulation of retirement wealth. A recent

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.

example is the final report of the Canadian government's recent Task Force on Financial Security (2010), which made relatively little mention of the decisions associated with spending down retirement assets - rather, the key discussions about seniors consisted of the need for them to have saved, the level of savings, the need for them 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 research on drawdown has been relatively significant compared to twenty years ago, but clear, unambiguous and disinterested guidance on how best to drawdown 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 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 - such as 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, supportive children or a large defined benefit pension), etc. Further, a retiree's objectives likely change over time. The topic of decumulation is, consequently, dynamic and an ongoing challenge to researchers, to financial advisers, and to retirees themselves.

This paper is divided into three broad 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?". The first section reviews the literature on the decumulation behavior of current retirees. The second section describes the available drawdown strategies, including their advantages and disadvantages. We organize our discussion of these drawdown strategies into three main categories, (1) annuitization of wealth², (2) self-managed drawdowns³, and (3) hybrid

² 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

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. This section then consolidates the relevant findings of previous literature to provide insight into this question from the perspective of the various stakeholders, particularly 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).

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 retirees⁴. For instance, during his Nobel Prize acceptance speech on December 9th, 1985, Franco Modigliani commented that "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 decumulation 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). 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, those in the top income quintile actually accumulated wealth!

fixed in nominal dollars (Brown, 2009a). Consequently, the term “annuity” in this paper refers to this type unless otherwise stated.

³ 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”.

⁴ For empirical evidence of the low rates of voluntary annuitization, see Milevsky and Young (2007) and Brown (2009a) for U.S. statistics, and James and Song (2001) for an international perspective.

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 generally preferred 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 much 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.

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 spending and investing during retirement (Greenwald, Bryck, and Sondergeld, 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 spending 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, Meredith, and Siegel, 2009) 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., 2009). This study unsurprisingly revealed that retirees felt less secure after the financial crisis, less confident that they have saved enough for retirement, more conservative and 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.

Brown et al. (2008) is a last example of a study that attempted to reconcile the void in available data by conducting their own survey. That study used survey evidence to explore various hypotheses to explain the near absence of voluntary annuitization. We discuss the findings later in this paper.

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 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 decumulation 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 decumulation 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, and then moving onto self-managed strategies. Lastly, we discuss hybrid approaches, where we also include annuity products with hybrid properties – in particular, investment-linked annuities. This section is intended to provide an overview of the various drawdown strategies, while Section “How SHOULD” contributes greater insights.

Annuitization

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

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 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.

Annuities offer security and a sustained income - they convert 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 given the recent turbulence in the financial markets, the continual breakthroughs in medicine and consequential growing 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) - in a given year, it "equals the percentage of the annuitant group alive at the beginning of the year who die during the year" (Blake et al., 2003, pg. 33). 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). 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 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 aggressively⁵, where the returns are likely to be higher than a conservative investment. 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.

Because of these benefits, economic literature has nearly unanimously agreed that, at least from a pre-tax personal income perspective, the financial welfare of most retirees would be enhanced by annuitizing a substantial portion of their wealth. 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 annuitize. 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 list 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. In Section “How SHOULD”, we present solutions to some of these drawbacks.

1. Rational decision arising from personal preferences and circumstances:
 - a. *Loss in liquidity*: Annuitization is a non-reversible decision and individuals cannot cancel an annuity agreement and recover the principal regardless of their financial needs (Brown and Warshawsky, 2001). 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 unfavourable rates to meet unanticipated expenses, e.g., to construct a wheelchair ramp to continue living in the same home. A still more unfavourable 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. Several studies have concluded, however, that the bequest motive does not significantly affect the annuity decision (see Brown and

⁵ 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 “Hybrid Strategies” for more discussion.

Warshawsky (2001) and Babbel and Merrill (2006) for a summary of this line of literature).

- 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 “Hybrid Strategies” for a discussion on delaying annuitization.)
- d. *Low risk aversion*⁶: 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, and 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., 2006; 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 accumulation years. Morrison (2000) found that the standard deviation of annual real earnings, divided by the level of those earnings, exceeded 0.4 for more than half of a very 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)*: Economists typically expect that personal discount rates are higher than inflation. For example, Gustman and Steinmeier (2005) found that 60% of their sample has a time preference rate of over 5%. “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). 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.

Included in this category 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 annuitize 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., 2006). Other personal circumstances could also play a role – for instance, according to survey results in the UK, annuities were most attractive to individuals with higher educations, reduced household size, higher income, and whose major pension source is DC or

⁶ 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.

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 most from the mortality risk pooling. In contrast, individuals with characteristics associated with *shorter* life expectancies would be averse to annuitize 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. Unfortunately, the market of enhanced/impaired life annuities in Canada and the U.S. is still quite 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).

- g. *Ability to pool risk within families*: Another explanation behind the aversion to annuitize 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 a list of references supporting this assertion). 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*⁷: 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 (Horneff et al., 2006). 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 such a vehicle 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*

⁷ 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.

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 (Brown and Warshawsky, 2001). 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. The guarantees for most of these programs are also indexed for price inflation. 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. *Illiquid wealth:* Household wealth may be illiquid (e.g., in property or businesses) and not available for annuitization without contracting for a reverse mortgage or finding some other means to tap into the equity.
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 arising from adverse selection. For a summary of studies that postulated that annuity demand is sensitive to pricing, see Brown (2008).

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). This self-selected group generally has better mortality than the average population - causing insurance companies to assume longer life expectancies and thus to charge higher prices for annuities.

When pricing annuities, financial institutions also need to account for their exposure to systematic mortality improvements⁸ and the lack of available assets to hedge their annuity products (Brown, 2008; Rashbrooke, 2007).

Adverse selection can also create a vicious circle. As longevity expectations increase, annuity providers charge higher premiums to protect themselves against the risk of adverse selection, which in turn deters potential customers and decreases purchases, thus creating a more select group of purchasers, and so on

⁸ These are the mortality improvements that affect the entire population, and therefore cannot be diversified by insuring a larger group of annuitants.

(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).

Mitchell et al. (1999) calculated the additional expense from an annuity's transaction costs to be 18 - 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. Calculations done by Babbel and Merrill (2006) suggested that the rates reported by Mitchell et al. (1999) are now lower. James and Song (2001) found that the expense loadings were somewhat lower in other countries around the world. Babbel (2008) also showed that the load from sales and administrative expenses on more current annuities are lower than the investment expenses incurred when self-investing in a mutual fund. Daykin (2004) further 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. This situation could continue in the U.S., but longevity pricing (and hedging) has more recently become a very real feature of the UK annuity market.

- b. *Poor financial market environment:* Retirees could be dissuaded from annuitizing because of current poor financial conditions (low underlying interest rates or a drop in the value of their accumulated wealth). For example, work by the OECD (2009) showed the impact of the market crash of 2008 on a retiree wishing to annuitize wealth. For example, an American who reached retirement age 65 in 2007, and annuitized his portfolio of 40% bond and 60% equities, would have enjoyed a replacement ratio equal to 24% while the identical, but less fortunate, American reaching age 65 at the end of 2008 would have had a replacement ratio of only 15%.

The higher the interest rate used in pricing an annuity, the sooner individuals will be willing to annuitize (Horneff et al., 2006) 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) (*ibid*). Blake et al. (2003) 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., 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. In the UK, Orszag (2000) suggested that the issue is more one of public awareness than of market incompleteness, as equity-linked annuities have been available for some time in that country. Indexed annuities could also 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)
 - i. overcome the lure of a lump sum,
 - ii. become convinced of the value of an annuity despite its lack of popularity,
 - iii. select an insurance company and product from among the many,
 - iv. 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 (participants are much more self-selected in the private market, thus producing more adverse selection).

Unsurprisingly, 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).

- e. *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 Merton (2006) also 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.

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. *Sex-distinct mortality assumptions*: Annuities are generally 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... (since) 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).
 - g. *Tax treatment*: Depending on the country, tax treatments could be relevant if a decision to receive annuity income means not taking advantage of more favourable 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”).
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.

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 affect 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 the trust component between agents/providers and purchasers of annuities (see 2e). The purchaser will want to be confident that an advisor is making a recommendation that is in the purchaser’s best interests, as measured from the purchaser’s perspective. Iannicola and Parker (2000) found that the remuneration of financial advisers can create conflicts of interest between the advisers and their clients.

- b. *Longevity gamble*: People think of annuities as a gamble, where the odds favor the insurance company (Brown and Warshawsky, 2001). Although this is not necessarily a rational reason for not purchasing a life annuity, there is some truth behind this aversion since there is a gamble implicit in the purchase of a life annuity. As Milevsky (2002) explained, a life annuity can 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” (pg. 11). Further, the odds do in some sense 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*).
- c. *Mental accounting*: Individuals practice mental accounting, such as asking themselves “will I live long enough to make back my initial investment” (Brown, 2009a, pg. 194).
- d. *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.
- e. *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 assets but, rather, they consider each asset separately and follow social norms and disjoint ideas (such as not considering their level of guaranteed income from Social Security, employer plans, and annuities when deciding the investment strategy for their remaining wealth).

- 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 assessing when to change 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.
- f. *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. 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).
 - g. *Buyer's remorse*: Babbel 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.
 - h. *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.
 - i. *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; Babbel 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.
 - j. *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.

- k. *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.
- l. *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).
- m. *Discouraging level of income*: Individuals could be discouraged to annuitize by the low monthly income that their accumulated wealth is able to purchase, owing potentially to having saved insufficiently (Daykin, 2004).
- n. *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.
- o. *Other*: Other feasible behavioral biases include the aversion of individuals to think about unpleasant events such as dying or being old and poor, and ignorance on the probability of survival (Brown, 2009a). Procrastination is also a possibility - it is easier to do nothing than something, particularly when it comes to a very important decision⁹. Further, given the lack of popularity of annuitization, fear of the potential negative opinions of others regarding the purchase could play an important role.

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 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., 2006). 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 that Babbel (2008) for a list of references supporting this). Other personal characteristics were also found to be associated with risk aversion (such as 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

⁹ These two explanations were proposed by Malcolm Hamilton via personal correspondence in May, 2011.

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. A final example of the inter-relationship among these explanations for annuity aversion is that lower interest rates, such as those leading up to and through the 2008 downturn, would dissuade prospective annuity clients from purchasing them in 2b, although such a downturn could have the opposite effect by generally reducing risk tolerances of individuals and raising the desirability of an annuity's security (1d).

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 study¹⁰ 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 risk assets at that time)¹¹. 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 decumulation 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.

¹⁰ The study was published in Warner and Pletter (2001).

¹¹ See Brown (2009a) for additional arguments as to why price is not a major explanation behind the lack of demand for annuities.

Substantial literature has analyzed the optimal level of annuitization under various individual preferences (primarily, preferences regarding risk and desire for bequests) and financial market environments. They have nearly all concluded that some level of annuitization is optimal, at least from a pre-tax perspective, even after modeling many of the drawbacks listed above. Consequently, more recent literature has begun to attribute the near universal aversion of any voluntary annuitization to non-rational psychological or behavioral biases that have not yet been captured in any economics model (Davidoff et al., 2005).

Self-Managed Drawdown Strategies

A primary advantage of self-managed drawdown strategies is that 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 earlier, having access to a pool of capital when a financial need arises could mean not having to borrow at unfavourable rates or being obliged to reduce consumption and fund the expense from fixed annuity income. Self-management also offers the possibility of consuming more while alive relative to annuitization if investments thrive. 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 full 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 be difficult to tolerate (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 caregivers¹² 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 a retiree, 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 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 decumulate (see Section “How DO” for empirical studies of supporting this).

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 state¹³. 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 (mandatory annuitization is discussed further in Section “How SHOULD”).

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; or (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 each drawdown strategy from the perspective of the retiree.

¹² In Canada, informal caregivers were responsible for 70% of the hours of support provided to elders with a long-term health problem (Lafrenière et al., 2003).

¹³ 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.

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 (the value of their discounted expected utility was relatively very low).

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). Another way of looking at the term “ruin” is by way of contrasting examples. 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”. Another senior may have annuitized only, say, 5% of her wealth at retirement, thereby being exempt from “ruin,” but be easily capable of covering off that same expense by withdrawing part of her stock of non-annuitized assets.

The following is an illustrative list of several of the better known fixed drawdown strategies, where (a) gives the name and description, (b) shows the withdrawals using formulas (subscript R signifies the time of retirement), and (c) includes some observations made in past studies¹⁴. 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 years¹⁵;

¹⁴ In an attempt to simplify previous findings regarding these strategies, we do not include the numerous assumptions underlying each study’s analysis.

¹⁵ Strategies #1 (ii) and #3 (ii) are slight modifications of a strategy described in Avery and Morrison (2009), which is given in #4 (ii).

- 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. $Wealth_R / (MaximumAgeInMortalityTable_R - Age_R)$ $Withdrawal_{t+1} = Withdrawal_t (1 + Inflation_t)$ for $t \geq R$
- 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.

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 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 (strategy (iii) is similar to the variable strategy 3(iii) examined by Dus et al. (2004), which we discuss below).

- 2. Fixed percentage of initial wealth;
 - a. The withdrawal is set at retirement to equal a percentage of the initial wealth, such as:
 - i. a specific 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. the proportion of wealth that would generate the same income as the payout of a life annuity purchased at retirement (Blake et al., 2003; Horneff et al. 2006).
 - b. $Withdrawal_R = Percentage_R \times Wealth_R$
 $Withdrawal_{t+1} = Withdrawal_t (1 + Inflation_t)$ for $t \geq R$
 - c. Notes: The 4% Rule will most likely succeed in delivering an inflation-indexed fixed level of consumption 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 (*ibid*). Consequently, the 0.04 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) also treats the initial withdrawal proportion as a parameter.)

Strategy 2(ii) is known as “self-annuitization”. 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). The advantage of not making the adjustment 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 withdrawal will decrease, which becomes a more and 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 income is evaluated (as has been the case for the vast majority of past published studies - see the beginning of Section “How SHOULD”). If actual consumption is to be smoothed rather than income, however, then the retiree would realistically need to tweak the periodic withdrawal amount owing to taxation. 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. The nature of the adjustment necessary to create smooth consumption depends in a complex way on the mix of income types (interest, dividends, capital gains, withdrawal of principal), tax brackets and positioning relative to the break-evens for any relevant income-tested benefits.

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 changes to the portfolio composition (Avery and Morrison, 2009). 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 delivered under variable strategies can become extremely low (Horneff et al., 2006). On the other hand, many families experience substantial earnings fluctuation during the accumulation phase of their lives (Morrison, 2000), suggesting that they are able to continue to adjust when necessary after retirement. The retirees in the Greenwald et al. (2006) survey study also expressed this opinion.

We next summarize several variable withdrawal strategies.

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. $Wealth_t / (MaximumAgeInMortalityTable_R - Age_t)$ 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 in strategy (iii) the withdrawals 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. $Wealth_t / DisabilityFreeLifeExpectancy_t$ 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 percentage of remaining wealth;
 - a. The withdrawal is recalculated each year to equal a percentage of the remaining wealth, such as:
 - i. a fixed fraction of remaining wealth (Dus et al., 2004);
 - ii. a non-fixed percentage, 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. $Withdrawal_t = Percentage_t \times Wealth_t$ 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., 2006 for Canadian studies). In fact, it could be at advanced ages that the 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.

A weakness in past literature is the complete absence of drawdown strategies that respond to personal circumstances and associated financial needs that vary period by period, such as replacing a car, moving, refitting a home because of a disability, or an impending death when health status changes. Past economics literature has nearly unanimously concluded that individuals would maximize their lifetime consumption by annuitizing at least some of their wealth. If a drawdown strategy that was reactive to health status were examined, for example (such as a drawdown strategy whose payouts double at the onset of a significant health condition to either cover new medical expenses or for the individual to enjoy his/her wealth before a foreseeable death), it could potentially generate higher lifetime consumption than annuitization for those with lower lifetime expectancies and therefore shed light on the lack of voluntary annuitization puzzle. The challenge when analyzing this new category of drawdown strategies would be in modeling the specific personal circumstances and associated financial needs (such as modeling health status in the above example).

Hybrid Strategies

Finally, there are also hybrid approaches – 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:

- S/he could secure a basic level of income by annuitizing some assets, while self-managing the remainder. For example, s/he 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”) to yield a lifelong income and still provide a source of funds in the event of an unexpected, uninsurable expense.
- S/he could elect to self-manage his/her assets for one portion of his/her 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.
- S/he could purchase a deferred annuity at retirement that would commence in a fixed number of years with a portion of his/her wealth and self-manage the remaining assets during the interim. This option (the ‘deep-deferred annuity’ or ‘longevity insurance annuity’) is gaining interest. An attractive possible add-on feature is a benefit on death during the deferral period. 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” (Brown, 2009b) where annuity purchases are spread out over time. 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 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 choose to invest their retirement saving contributions in a particular fund, members are given the option to use their contributions to purchase deferred annuity contracts. 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*).
- 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 mixed strategy protects the retiree's income from individual savings from falling below the floor guaranteed by the annuity's payments. Hybrid strategies further 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). Mixed strategies also provide the flexibility and the potential for bequests of a self-managed strategy. 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 "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 (Horneff et al., 2006; 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., 2006).

A further attractive feature of hybrid approaches is the benefit gained by delaying annuitization. Several researchers have suggested that households should delay the purchase of annuities that payout immediately, or to purchase deferred annuities. 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 "Annuitization"). Consequently, delaying annuitization could enhance consumption while protecting the individual from longevity risk later on in life.

The optimal annuitization age has been observed to 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).

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. (2006) (see Table 1 therein).

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 "Annuitization" in Section "How COULD" 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 improvements¹⁶.
- 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 (see below for more information).
- Variable annuities in particular are reported to have low loads and administrative fees (Horneff et al., 2007).
- 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

¹⁶ As explained in Section "How COULD", 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

extremes of a pure withdrawal plan, on the one hand, and a fixed annuity, on the other” (pg. 22).

- 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*).

Since variable annuities represent the majority of annuities sold in the U.S. (Horneff et al., 2007), 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, and the proportion of stock wealth should decrease. 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?

Research Methodologies

The best approach to manage retirement wealth depends on *known* factors such as the person’s circumstances and preferences, but also on 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. To evaluate alternative drawdown strategies on a quantitative

basis, researchers make a number of assumptions about the future and rely on a variety of measures. We next examine the three most common methodologies, 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"¹⁷ preference is the most common approach to quantitatively evaluate the individual welfare generated from different drawdown strategies (Dus et al., 2004). To maximize lifetime utility, the most common approach has been to use dynamic programming. Examples of these studies include Webb (2009), Mitchell et al. (1999), Brown (2001), and Gerrard, Haberman and Vigna (2006), and Horneff et al. (2006). The standard utility function generally used features constant relative risk aversion, exponential discounting at a fixed rate, and additive separability¹⁸ (Davidoff et al., 2005).

Some studies use a utility framework to determine the optimal strategy, but 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); Blake et al. (2003); Doyle and Piggott (2003); Davidoff et al. (2005); Horneff et al. (2006); Horneff et al. (2007); Milevsky and Young (2002); (2007); Koijen et al. (2009)).

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.) Further, researchers' definitions of utility may not have matched those of the modeled individuals closely enough. Given the wide range of individuals and their objectives, the use of any single definition of utility is problematic.

(2) Minimizing the probability of lifetime ruin

There is a series of papers by a group of authors that determined optimal strategies by

¹⁷ Although the term "consumption" is used in this line of research, the amount actually modeled is generally pre-tax income. We elaborate on this below.

¹⁸ 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).

exclusively employing the probability of lifetime ruin as the risk metric¹⁹. 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, the 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, it does not follow the standard economic theory of consumer utility maximization (*ibid*). Further, depending on the type of study, looking only at the probability of ruin masks the additional value of strategies that deliver higher consumption than others (Sun et al., 2006). Results that ignore tradeoffs between the positive factors associated with increased consumption, and the negative factors associated with running out of wealth, could lead to strange conclusions – 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 (*ibid*). This approach also does not put a value on bequests (Albrecht and Maurer, 2002). Lastly, lifetime ruin is not a real-world concern for citizens of countries where the government shares in the downside risk by offering social income-tested benefits for seniors (for discussion, see “Fixed Strategies” in Section “How COULD”). The measure can, however, be altered so that “ruin” is defined at a non-zero value, such as the level that an individual would be eligible for social assistance (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 consumption that these withdrawals permit (Avery and Morrison, 2009)
- the expected amount of the original portfolio remaining at the end of a specified

¹⁹ 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).

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)²⁰;
- 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., 2006))
 - this is otherwise known as the Value at Risk measure;
- 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., 2006; 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 were computed using several approaches:

- 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); and
- using past investment experience from empirical data (Ameriks et al., 2001).

For example, 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)).

As an example of using historical investment data to examine drawdown strategies –

²⁰ When the specified period is lifetime, this measure then becomes the probability of lifetime ruin.

Ameriks et al. (2001) showed the maximum sustainable withdrawal from various investment portfolios over rolling 30-year period for retirement dates between 1946 and 1970.

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 improves the value of the longevity insurance feature of annuitization. Second, 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 opposites are similarly true.

In these three methodologies, the unit of measurement can be pre-tax, post-tax, or general consumption that includes all sources of retirement income, taxes and government transfers (Avery and Morrison, 2009). The use of pre-tax income has been the practice among analysts in previously published research when quantitatively comparing alternative drawdown strategies, and consequently nearly all of the findings reported throughout this paper are based on the pre-tax approach. It is possible that the recommendation of one drawdown strategy over another could be substantially altered if actual household consumption were measured rather than solely the before-tax income generated by the individual's savings. Despite the explanations given by some authors for their pre-tax approach²¹, the likely explanation behind the neglect of 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 above). 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

²¹ For instance, for those authors who comment on the absence of taxes and government provisions in their analysis, the common assumption was 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).

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 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 examined the total annual consumption of the individual – that is, they included 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). 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 so as to maximize the value of income-tested social benefits, particularly those seniors with few private retirement income sources (see “General Advice” later in this section for a discussion on the moral hazard in drawdown strategies, as well as additional insight on the importance of the country of residence's tax and benefit transfer system when evaluating alternative drawdown strategies).

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 avoidance) 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 complicate issues further.

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 its 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's), 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. Analysts understandably ignore these kinds of changes given that they would be very difficult to predict or model.

Findings of Past Research: Annuities, the Financial Industry and Public Policy Makers

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 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 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. They found that annuities, despite being actuarially unfair²², were preferable to the optimal decumulation 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 - the authors captured this by comparing the expected utility of purchasing an annuity to the expected utility of the optimal drawdown strategy. 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. Babbell 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 all concluded that, at least from a pre-tax 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. Babbell (2008) reported that, after having reviewed 70 papers

²² 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.

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).

Despite the growing body of research that favors annuities from among the possible drawdown strategies, voluntary annuitization rates remain very low. 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.

There has been some support for annuitization as a part of public policy in past published literature. For instance, Blake et al. (2003) explained that mandated annuitization at a particular age reduces the risk of outliving wealth, as does the requirement that withdrawals from self-managed portfolios be linked to the fund size (that is, a variable strategy). Davidoff et al. (2005) attributed the aversion for voluntary annuitization to behavioral and psychological biases, and suggested that some mandatory annuitization would increase the welfare of individuals. Another advantage of mandatory annuitization is that annuities could be cheaper as the mortality experience would be broader and the DC plans could negotiate lower fee rates through economies of scale. Further, by helping to sustain retirees until their death, mandatory annuitization has the advantage of reducing the government’s role in providing a means-tested transfer to those who exhaust their savings and reducing the cost of other social welfare programs. Mandated annuitization also alleviates public policy makers of the burden to educate citizens in properly managing their retirement wealth.

On the other hand, there have been several concerns raised regarding mandated annuitization, for instance:

- Mandated annuitization removes individual choice. Brown (2009b) explained that there is no universal proportion of individual accounts that is best annuitized since it depends on the household’s other sources of retirement income, preferences and personal circumstances. Consequently, individuals (even financially unsophisticated individuals) are generally in a better position to evaluate their needs than having it prescribed by a universal level (*ibid*).
- Further, if individuals are forced to use drawdown methods that they, apparently quite clearly, do not prefer, they could respond by saving less (see Section “Self-Managed Drawdown Strategies”). Consequently, mandatory annuitization policies that are intended to reduce drains on income-tested social programs might have exactly the opposite effect.
- If annuity providers under a mandatory system are required to use unisex mortality tables (such as was the case for Personal Pension arrangements in the UK), the attractiveness of annuitization for women will rise owing to their longer

life expectancy, and will fall for men who will receive lower benefits than had the insurer used sex-distinct tables (Dus et al., 2004). Conversely, if insurers use sex-distinct tables, women could feel that they are unfairly discriminated against since the price of an annuity would be 10 to 15% higher than that of a man of the same age (Daykin, 2004).

- Individuals with relatively low income, less education, and bad health have a relatively lower life expectancy and consequently have exhibited the most hostility to mandatory annuitization since they would have the least to gain (Gardner and Wadsworth, 2004). This group is, moreover, most exposed to lower lifetime economic welfare. Their retirement security would, therefore, be doubly threatened if they were obligated to pool longevity risk with the entire population as this would further reduce their already low lifetime consumption. It is difficult to incorporate fair treatment of impaired lives within such a system.
- Although compulsory annuitization could be suitable for risk-averse individuals, they can be costly for less risk-averse individuals who would achieve much higher levels of utility by increasing their exposure to equities (Blake et al., 2003; Horneff et al., 2006). Similarly, many individuals have rational reasons not to annuitize, such as the desire to leave a bequest and the possession of adequate annuitized income, and an annuity mandate would be harmful in their case.
- Mandated annuitization is generally prescribed at a particular age; the optimal time to annuitize is, however, affected by personal preferences. For instance, as an individual's risk tolerance rises, s/he achieves higher utility by continuing to invest in equities and delaying annuitization (Blake et al., 2003; Horneff et al., 2006). Nevertheless, Horneff et al. (2006) found that converting to an annuity was optimal for all risk preferences by age 85, lending support to Germany's 85-year-old age of compulsory annuitization.
- Mandating annuitization at a particular age would leave individuals completely at the mercy of financial market conditions at the time that the annuity must be purchased (Daykin, 2004).
- Plan sponsors could react negatively to an annuity mandate by refusing to sponsor new plans or terminating their current plans, thus intensifying the number of employees not covered by a private pension plan (Perun, 2004).
- A mandated level of annuitization could be administratively burdensome (Brown and Warshawsky, 2001).
- Financial institutions are careful when taking on annuity business since it exposes them to "a high concentration of systemic longevity risk and usually also exposes the insurer to significant asset/liability mismatch risk" (Daykin, 2004, pg. 22). When annuitization is mandated, annuities would become a dominant product and could possibly create unmanageable risk for insurance companies.
- Finally, financial institutions that offer annuities could take advantage of the mandatory purchase requirement by arbitrarily raising prices for profit (Orzag, 2000).

An alternative to mandatory annuitization at a particular age, discussed in Brown (2008), is the mandatory purchase of a deferred annuity at retirement that commences at a future fixed age - for example, age 80. This option has the attraction of providing longevity

insurance at a reduced price (owing to the discounting for both interest and survival over the deferral period in the pricing of the deferred annuity). The disadvantage is that the retiree could die before receiving any payments, unless the policy incorporates a death benefit for the deferred period. Also, as noted earlier, the real value of any future payments would be reduced by inflation during the deferral period if they were not indexed by inflation (Shapiro, 2010). Moreover, this alternative does not remove any of the concerns regarding mandatory annuitization listed above.

Given the drawbacks of mandated annuitization, less extreme policy options have been recommended. To enhance retirement income security, for example, Brown (2009a) proposed an automatic annuitization program where annuitization would be the default option for all DC plans in the U.S. In this program, individuals would have the option to “opt-out”, thus preserving individual choice. In addition, only half of their accumulated wealth would be annuitized under the default, leaving the other half liquid to cover the unknown financial needs of retirement – such as an uninsured medical expense. Brown advised Congress to encourage this program by reducing the administrative burden for plan sponsors to offer this default option and, potentially, including automatic annuitization as a requirement for plan qualification. His paper provided detailed advice and step-by-step instructions to implement this program. Other possible policy options include encouraging or requiring plan sponsors to offer annuities as a distribution option, as well as offering favorable tax treatment to retirees who choose to purchase an annuity rather than to self-manage their drawdown (Brown and Warshawsky, 2001; Orth, 2008). Favorable tax treatment would be, however, potentially unfair for those who are rationally justified in not purchasing an annuity.

Plan sponsors in the U.S. could perhaps be more inclined to offer annuities if their fiduciary burden were alleviated by reforms in the U.S. life insurance industry (Perun, 2004). An example of such a reform would be to improve the uniformity of regulations between U.S. states in order to standardize annuity providers and their products across the country, thus reducing the fiduciary exposure of plan sponsors when made to pick the “safest annuity possible” for their members by regulators (*ibid*). A strong federal regulator would also reduce the risk of insurer default and improve the safety of annuities in general, which would increase their appeal to both plan sponsors and members. A 2008 ERISA Advisor Council Report on the Spend Down of Defined Contribution Assets at Retirement (ERISA, 2008) made a number of recommendations intended to remove barriers facing plan sponsors and fiduciaries wishing to include lifetime income options in defined contribution plan designs. These recommendations include simplification of annuity provider selection rules, elimination of the requirement for an “independent expert”, clarification of “qualified default investment alternatives” pertaining to guaranteed lifetime income products, as well as recommendations regarding communications and education on retirement income options.

Another means for governments to improve the demand for voluntary annuitization could be to issue mortality-linked securities (e.g., longevity bonds), which would help to hedge the systematic and non-diversifiable mortality risk for insurers (see Brown (2008) for a list of studies examining this option). Improving financial literacy is also an important

means to empower citizens to make the right drawdown decisions (which is, according to most researchers, annuitization). Rappaport (2008a) emphasized the need to provide people with comparative information regarding retirement income versus lump sums. She explained that, since many people are not financially sophisticated, they need to be shown the advantages of electing a lifetime income. The default option in pension plans is also important and, like Brown (2009b), Rappaport (2008b) described in detail the issues associated with determining default options.

As a final comment on the topic of encouraging annuitization as a part of public policy – despite the overwhelming support for annuitization by past published research, the expansion of non-voluntary public pension plans (C/QPP in Canada and Social Security in the U.S.) is not among the suggested alternatives that are partial substitutes for annuitization although, apart from not being part of the private sector, it exhibits many of the positive features of annuitization without the drag of self-selection. Recent resistance in the U.S. and Canada to expanding Social Security and the C/QPP do not suggest a will for this type of mandated solution among policymakers²³.

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.
- *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 – 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.

²³ For instance, the Globe and Mail recently commented that the Canadian federal government’s abandonment of a Canadian Pension Plan expansion, which was allegedly due to provincial preferences, was not publicly favored according to polls (Curry, 2011).

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 appeal, such as:

- The option for deferred annuity holders to prematurely annuitize without penalty and/or to make penalty-free withdrawals (Babbel, 2008).
- 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 “Annuitization”, this is known as a longevity insurance 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). Section “Annuitization” referred 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*)²⁴. 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 would also benefit monetarily through higher annuitization rates through the reduction in payouts of social income-tested senior programs. 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 from these that the most important consideration when deciding how to decumulate retirement savings is a household’s other financial retirement resources, which we have broken down between (1) individual and

²⁴ See Shapiro (2010) for an extensive summary on existing financial products for retirees, as well as those envisioned for the future.

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, Webb (2009) offered very sound advice on the annuitization decision. He suggested that households should have a secure income stream to cover their lifetime daily expenses (for both spouses in the case of couples). If income from their employer DB plan²⁵ and Social Security benefits²⁶ do not meet this target, then they should make-up the majority of the shortfall by purchasing inflation-protected annuities, and the remainder of the shortfall by purchasing variable annuities (both joint-life without guarantees). Brown (2009b) shared this advice, suggesting that the appropriate level of annuitization would be such that a household's essential monthly expenses would be met by its guaranteed monthly income (that is, individual private annuity income, Social Security payments, income from DB pension plans and any other guaranteed lifetime income). Babbel and Merrill (2006) added that the supplemental private annuity should come from a high-grade provider to avoid the possibility of default. Sondergeld and Greenwald (2007) further explained that inflation must be accounted for; if a guaranteed income source does not keep up with inflation, therefore, then 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*).

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

²⁵ 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).

²⁶ Webb pointed out that postponing U.S. Social Security benefits is the cheapest means to annuitize and, with only some exceptions, all Americans should delay claiming their Social Security.

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). 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). Alternatively, homeowners could tap into the equity of their home through vehicles such as reverse mortgages.

In Section “Annuitization,” loss of liquidity was given as a reason that voluntary annuitization is unpopular since large, irregular and uninsurable expenses can arise during retirement. If insurance for a particular financial risk is available, however, then Brown (2009a) explained “forgoing annuitization is an inferior strategy to buying both annuities and insurance against the shocks, such as long-term care insurance in the case of nursing homes” (*ibid*, p191). Some financial risks are, moreover, fairly stable in nature and could be best handled by purchasing an annuity. For instance, 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 (*ibid*).

(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 OAS and GIS and, while some sources of income for seniors are taxed as ordinary income, others are not ²⁷; consequently, the inclusion of Canadian tax and benefit transfer systems is likely to have an important effect on the overall pattern of consumption 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

²⁷ For instance, in Canada, while Old Age Security benefits are subject to income tax, Guaranteed Income Supplement 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.

if government taxes and transfers are taken into account. As was seen in the Avery and Morrison (2009) results, it could be optimal, at least from the perspective of total lifetime real consumption, for some Canadians to consume their individual savings during their disability-free life expectancy and fall back on government transfers at advanced ages. Although this approach is potentially the most beneficial to the individual, “the possibility that pensioners will spend their assets quickly and fall back on state welfare provision” (Brown and Warshawsky, 2001, pg. 38) could be seen as a moral hazard from a public policy perspective. On the other hand, as governments create systems of tax and benefit programs to meet various societal objectives, there is an expectation that retirees will arrange their affairs to optimize consumption within the constraints and opportunities that these systems provide. As the U.S. jurist Judge Learned Hand said “Anyone may arrange his affairs so that his taxes shall be as low as possible; he is not bound to choose that pattern which best pays the treasury. There is not even a patriotic duty to increase one's taxes. Over and over again the Courts have said that there is nothing sinister in so arranging affairs as to keep taxes as low as possible. Everyone does it, rich and poor alike and all do right, for nobody owes any public duty to pay more than the law demands”. The generally equivalent counterpart in UK jurisprudence is known as the “Winchester Principle”. The issue reflects a recognition that for voluntary savings, the saver necessarily gets the last word in terms of whether to save, how much to save, and how to draw down those savings.

Further, the concern that seniors will spend their savings too quickly stands in contrast to the frequent findings that retirees are slow in spending down their savings (see Section “How DO”), to the point that governments may force certain minimum withdrawals, such as the Canadian regulations for Registered Retirement Income Funds that ensure that the withdrawals are taxed in a timely manner and will serve to reduce social benefit transfers otherwise payable.

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.

Other considerations

When determining the best drawdown strategy, there are clearly tradeoffs. Gerrard, Haberman and Vigna (2006) used dynamic programming to examine the optimal consumption path and time to annuitize, and found that if more importance was put on an annual income target, then the income obtainable from future annuitization would be less secure, and vice-versa. In their model, this tradeoff would be handled by choosing appropriate parameters when setting the optimization problem. Likewise, in the real

world, it is important that pensioners understand their preferences at the outset of their retirement so that they can plan properly to minimize their risks in the preferred areas. From this perspective, there is no universal ‘best’ drawdown strategy since it depends on the retiree’s various circumstances and preferences. There are, however, good insights to be gained from the past research outlined in this paper. In addition to the above considerations with regards to other sources of retirement wealth, the following factors should 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 population²⁸, 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 (2004), 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. 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 higher bequest to a person’s estate than one that is more aggressive, it will also likely produce lower annual consumption, lower annual taxes, different levels of government transfers, and more management fees to fund managers (Avery and Morrison, 2009). In the extreme, overly conservative withdrawal strategies can

²⁸ 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 on possible causes behind this trend, see in Canada (Brzozowski and Lu, 2005) and the U.S. (Aguiar and Hurst, 2005; Hurd and Rohwedder, 2005).

lead to annual and lifetime real consumption levels that are actually lower than had there been no savings, but with very positive outcomes for governments and heirs (Avery and Morrison, 2011).

Among the variable drawdown strategies listed in Section “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:

- Partially annuitize their wealth and use the remaining wealth to purchase life insurance coverage (insurance premiums could, however, become quite substantial at advanced ages).
- 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 for the guaranteed period.
- Partially annuitize their wealth and use the remaining wealth as a bequest to heirs (Davidoff et al., 2005).

The appeal of the first and third 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, an organized self-managing retiree could ensure the amount and/or timing of a bequest by doing any of the above 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 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 duration. 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. 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 (Ameriks et al., 2001). In either case, the retiree should not attempt to time the market and make frequent transfers between assets (Greenwald and Sondergeld, 2007).

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%. To confuse matters further, recent literature suggests that the historical equity premium has been exaggerated and that exposure to risky-assets should be lower, and not higher, for longer-investment horizons (Jacquier, Kane and Marcus, 2005).

- *Attitude towards risk with regards to investment strategy:* If a household is willing to accept major fluctuations in the value of its financial assets over time, it could choose a more aggressive strategy and take advantage of the equity-heavy portfolio since equities have, historically, almost always outperformed bonds over the long term (see Blake et al. (2003) for a list of references supporting this). In fact, the greater a person’s appetite for risk, the more it is optimal, from a quantitative evaluation of utility, for s/he to increase the portfolio’s exposure to equities (Blake et al., 2003; Horneff et al., 2006). Even very risk-averse individuals should hold 40% of their assets in equities (Horneff et al., 2006). (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. (2006), variable drawdown strategy #3 (i) in Section “Self-Managed Drawdown Strategies” (spend remaining wealth over life expectancy) was appealing to low and medium levels of risk aversion, but not so for high levels of risk aversion. Complete and immediate annuitization was the most appealing only for the very risk averse retiree. The least desirable strategies²⁹ across all risk levels were the fixed income strategy 1 (ii) and variable strategy #3 (iii) (spend remaining wealth over maximum

²⁹ Horneff et al. (2006) did not, however, examine all of the strategies that we have listed in Section “Self-Managed Drawdown Strategies”.

duration of the plan). The most desirable was a fixed percentage rule (strategy #5 (i)).

- *Guaranteed income from other sources:* A household with sufficient 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 adequate 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 the 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 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 encouraged 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 instead of helping to improve it.

- *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 sound and pre-planned strategies 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.
- *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 Social Security or Canada Pension Plan and Old Age Security pension benefits are indexed to inflation, and many defined benefit 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 all 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. The estimation of life expectancy has 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.

- *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). In specific, the likelihood that a surviving spouse lives beyond age 90 is 73% for a husband aged 65 and wife aged 62 (Mills and Young, 2004). This unexpected decline in economic welfare (and possibly even poverty) comes, moreover, at a time that 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 DB pension plans and Social Security. Lastly, proper wills and estate planning is essential (SOA, 2008).

In retirement, it should also be recognized that divorce is not uncommon. “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 health status, which could create unexpected health care needs and costs, loss of the ability to live independently, and change in housing needs (SOA, 2008). SOA (2008) 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 decumulation phases.
- *Informal support network:* Expectations of financial and non-financial support from family/friends and other personal circumstances can also play a role in determining the best drawdown strategy. The opportunity to have 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. Care can provide important services that a retiree might otherwise have to pay for or do without. In addition, sincere advice and concern can become invaluable as there are many risks to balance and individual responsibility when self-managing wealth.

- *Fraud*: With age, there is a greater risk of making bad judgments, including being misled by unscrupulous advisors, since mental health, as well as physical health, often deteriorate with age. In recent literature, a SOA report (Iannicola and Parker, 2010), a report by the Canadian Task Force on Financial Literacy (2010) and analysts such as Fishman (2010) discussed seniors' vulnerability to fraud and scams. "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. 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*).

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)³⁰ 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*).

³⁰ 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

- *When to annuitize*: Knowing the optimal time to annuitize has been an important focus of many researchers (e.g., Blake, Cairns, and Dowd (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 ages³¹. See Section “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., 2006; Milevsky and Young, 2007).
- *Uninsured financial risks*: As explained in Section “How COULD”, 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 could vary widely from provider to provider.

Conclusion

Much of the past research on the topic of retirement savings drawdown has explored how retirees “should” rationally think when decumulating their savings, but the question of how retirees “do” think, and their spectrum of preferences and trade-offs, remains largely unanswered. With the universal shift of pension plan provisions towards individual savings accounts³² 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.

A key area for future development in this line of research would be for analysts to include the country’s tax and benefit transfer system when quantitatively comparing alternative drawdown strategies for the purpose of recommending one strategy over another. Findings could be significantly altered if researchers considered the actual household consumption, including the various sources of retirement income, taxes and government

‘i’ and the experience rate of return is ‘r’ then the payment will increase by the ratio $(1+r)/(1+i)$.

³¹ 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.

³² See Broadbent et al. (2006).

transfers, rather than solely the before-tax income generated by the individual's savings. If government taxes and transfers are incorporated, the widespread support for annuitization among researchers could be measurably altered – e.g., income-tested government benefits for seniors would undoubtedly improve the standing of any self-managed drawdown strategy since the downside risk is mitigated.

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 (Avery and Morrison, 2011) show that the real internal rates of return on retirement savings can be surprisingly low, much lower than the real return on the underlying investments.

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 to other important variables – notably health. For example, a drawdown strategy that adjusts to longevity expectations could prove more valuable to an individual from a lifetime consumption framework than (the generally preferred) annuitization.

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 Wisner (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.

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 rational 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 less rational driving motivations behind drawdown behavior of current retirees. Any uncovered “psychological and

behavioral biases”³³ 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 the behavioral element of 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 when 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 (Brown, 2009a). If, however, an avoidance of annuitization proves to be driven by fundamental preferences, the findings might suggest new financial products that would better meet the needs of retirees.

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