

## **Financial Education and Annuities**

Jeffrey R. Brown

University of Illinois at Urbana-Champaign and  
The National Bureau of Economic Research

## Executive summary

Life annuities – financial products that help individuals convert a lump-sum of wealth into a guaranteed life-long income stream – have an important role to play in providing a secure source of retirement income. Because annuities provide valuable insurance against longevity risk, much of the theoretical work in economics suggests that life annuities ought to comprise a large share of the retirement portfolios of most households. Yet around the world, voluntary annuity markets remain small.

A large number of studies have attempted to reconcile the theoretical value of annuities with the low level of voluntary annuitisation. While these studies have provided a number of important insights about the functioning of annuity markets and the role of annuities in individual portfolios, the literature as a whole has yet to produce a fully robust explanation of limited demand within the paradigm of a fully-informed and fully-rational consumer.

In addition to the difficulty of fully rationalising the limited demand for annuities, research has documented low levels of financial literacy through the world. A growing body of work in “behavioural economics” is providing substantial evidence that many individuals exhibit various behavioural biases when making financial decisions. The convergence of these findings raises the natural hypothesis that financial illiteracy may have a role to play in explaining the limited demand for voluntary annuitisation.

This report provides a review of the literature on the welfare-enhancing role of annuities, the limited size of annuity markets throughout the world, and evidence on the “rational” supply-side and demand-side explanations of the limited size of annuity markets. It then describes the nascent literature that explores the role of education, financial literacy, and various behavioural factors on the demand for annuities.

This report makes several sets of policy recommendations. The first set of recommendations is focused on the need for governments and private plan sponsors to encourage, rather than discourage, retirement income security. This includes emphasizing that providing secure retirement income is of equal importance to wealth accumulation and avoiding the inadvertent discouragement of annuitisation through public policy.

A second set of recommendations focuses on general tools for promoting retirement income security. This set includes the need to focus on retirement income during individuals’ working lives, a recognition of framing and other behavioural biases when developing programmes, and the consideration of designing default payout options that provide for guaranteed income.

A third set of recommendations focuses specifically on evaluating the role of financial education. This includes the need for resources to enhance our knowledge of what types of financial education are beneficial in promoting a focus on lifelong income security, and a call to focus on how these programmes influence behaviour rather than knowledge. It also recommends that the OECD take a leading role in serving as a clearinghouse of information on “best practices” in this area.

## *Table of contents*

1. Introduction.....	176
2. What is the appropriate role for annuities in retirement portfolios? .....	177
3. Annuity markets in the OECD .....	181
4. Why are annuity markets small?	
A review of the “rational” economics literature .....	182
4.1 Supply-side limitations to annuity markets .....	183
4.2 “Rational” demand-side limitations to annuity markets .....	190
5. Financial literacy, behavioural biases, and the demand for life annuities .....	193
5.1 General evidence on financial literacy.....	193
5.2 Education, financial literacy and annuity demand.....	194
5.3 Framing .....	196
5.4 Annuities and default options.....	198
5.5 Pessimistic beliefs about longevity .....	199
5.6 Shortsightedness .....	199
5.7 Other behavioural hypotheses .....	200
6. Policy options regarding financial education and annuities .....	202
6.1 The context: Is annuity demand fully informed and rational? .....	202
6.2 Policy recommendations .....	204
7. Conclusions .....	208
References.....	210

## 1. Introduction

A growing body of studies from academic, private sector and government sources documents a low level of basic financial literacy across OECD member countries as well as other countries around the world. A surprisingly large fraction of consumers lack the ability to compute compound interest, are unable to explain the difference between a stock and a bond, and are unable to correctly identify whether they participate in a defined benefit (DB) or a defined contribution (DC) retirement plan. The lack of financial literacy encompasses both skill-based deficiencies (*e.g.*, the inability to do simple calculations) and knowledge-based deficiencies (*e.g.*, lack of knowledge about various financial products). While financial illiteracy is particularly problematic among individuals with lower levels of education, studies suggest a surprising degree of financial illiteracy even among more highly educated populations.

Nearly all of the research that has been undertaken on financial literacy has focused on issues that are most directly related to savings behaviour and wealth accumulation. Precious little work has focused on measuring the extent of consumer understanding of issues pertinent to wealth decumulation, or the conversion of wealth into retirement income. In particular, we have very little direct information about the extent to which the population understands the important role of longevity risk in retirement planning or the role of annuities and other products in addressing these risks. The indirect evidence, however, suggests that consumer understanding of these issues is no better – and quite possibly worse – than general studies of financial literacy would suggest.

This omission is important because wealth accumulation alone is not sufficient to ensure financial security in retirement. Consumers must also be prepared to make important decisions about how to convert assets into a stream of consumption during retirement. In short, a comprehensive retirement planning strategy requires that an individual understand how to spend, not just how to save.

The issues involved with converting wealth into consumption are quite complex. Most individuals have limited knowledge about precisely how long they will live, and this uncertainty complicates the financial planning process. If a consumer under-estimates her life expectancy, and consumes “too much, too fast,” she runs the risk of a significant drop in her standard-of-living at advanced ages. Conversely, if she over-estimates her life expectancy, she foregoes the opportunity to have greater consumption throughout her retirement. In short, “longevity risk” significantly complicates an individual’s financial planning problem.

In every OECD country, both public and private solutions to the longevity risk problem exist in the form of annuitised pension benefits as well as private life annuity contracts. Life annuities are financial products that insurance against the financial risk arising from uncertainty about length-of-life by exchanging a lump-sum of wealth for an income stream that is guaranteed to last for life. Within the academic literature in economics, life annuities play a central role in improving individual welfare for risk averse agents.

In sharp contrast to economic theory, however, consumers around the world do not act as if they place a high value on annuities. Voluntary annuity markets are quite small in most countries – even in those where the fraction of overall

wealth annuitised by 1<sup>st</sup> and or 2<sup>nd</sup> pillar pensions is relatively small. Survey evidence and empirical studies in several countries confirms that most individuals appear to place little value on annuities.

This paper summarises what we know about annuity markets, with an emphasis on how consumers behave with respect to insuring longevity risk and the implications of this behaviour for financial education focused on retirement security. The paper begins, in section 2, by examining the benefits that annuities provide to consumers and the central role that annuities play in the economic theory of the life-cycle consumer. Section 3 documents the limited demand for annuities in OECD countries. In section 4, the paper discusses the large academic literature discussing both supply-side and “rational” demand-side limitations to the annuity market. A key theme of this section is that while there are numerous limitations to the market, there appears to be a residual consumer aversion to annuities that is not captured by standard models. In section 5, the paper turns to a discussion of financial literacy – both generally, and in the specific context of annuity demand. This section also explores numerous behavioural biases that have been hypothesised to influence consumer behaviour in this context, and discusses the emerging evidence in these areas. The analysis is brought together in section 6 in the form of a number of policy recommendations specifically focused on the role of financial education in informing annuity choices. Section 7 concludes the paper.

This report is part of the OECD Financial Education Project<sup>1</sup> that was initiated in 2003 in response to OECD government concerns over the possible adverse effects of low levels of financial literacy and financial education. In recent years, the OECD has become an international leader in the area of financial education, promoting the need for financial education and helping to set standards for it. The first major study of financial education at the international level was published in 2005. That report, “Improving Financial Literacy: Analysis of Issues and Policies,” identified and analyzed financial literacy surveys in OECD member countries, highlighting the economic, demographic and policy changes that make financial education increasingly important. The report also described the various financial education programmes being offered in OECD countries, provided an assessment of their effectiveness, and suggested actions for policymakers to improve financial education. In 2005, OECD governments endorsed a set of Principles and Good Practices for Financial Education and Awareness. The OECD is currently finalising work and developing a set of good practices for financial education in the context of pensions and insurance, which should be released in the first half of 2008, and conducting work on financial education and credit issues.

## **2. What is the appropriate role for annuities in retirement portfolios?**

Over the past several decades, all OECD countries have experienced significant reductions in average mortality rates at older ages, leading to significant increases in remaining life expectancy. For example, according to the OECD (2007a, p.22), “in 2005, life expectancy at age 65 in OECD countries stood, on average, at close to 20 years for women and over 16 years for men. This represents a gain of four years for women and 3.5 years for men on average across OECD countries since 1970.” Consistent with this finding, Antolin (2007) provides evidence that remaining life expectancy at age 65 has improved at a rate of approximately 1.1 years per decade.

The length of the average work-life, however, has not kept up with overall increases in life expectancy. Indeed, as noted in Table 1, for much of the period from the early 1970's to the early 1990's, most countries experienced a *decline* in labor force attachment at older ages. Over the past decade or so, many countries have seen average retirement ages rise, although they still remain well below the level of three decades ago. As a result, the combination of people longer lives and earlier retirements have led to individuals across the OECD spending substantially more years in retirement than ever before. This increases the importance of proper planning to ensure adequate retirement income.

Longer average life expectancies have not eliminated the *uncertainty* about how long one will live. For example, while an average 65 year old woman in the United States has a remaining life expectancy of approximately 20 years, there is a 7 percent chance of dying by age 70, and a 32 percent chance of surviving to age 90 or beyond, according to Social Security Administration life tables.<sup>2</sup> Such uncertainty significantly complicates the financial planning for individuals. If an individual knew exactly how long he would live, he could simply spread out his wealth over the fixed number of years remaining. For example, if he wished to have equal consumption in every period, he could simply amortise his wealth over the remaining life expectancy in order to provide a constant real stream of income until precisely running out of money (or leaving a planned bequest) on the day he died. In the absence of such knowledge, however, an individual must balance the risk of consuming too aggressively, potentially resulting in a large consumption drop at advanced ages, against the risk of consuming too conservatively, subjecting him to a lower level of consumption than he could otherwise afford.

Life annuities are products that insure against the financial risk associated with uncertain longevity. They do so by allowing an individual to use her accumulated wealth to purchase a stream of monthly payments that will continue for as long as the individual (and possibly her spouse) is alive. Essentially, an annuity contract allows an individual to obtain more resources in states of the world in which the marginal value of additional resources is high (namely, being alive at older ages) in exchange for giving up resources in states of the world in which resources have less value to the consumer (namely, when the individual is dead). Because a large part of mortality risk is idiosyncratic, i.e., uncorrelated across individuals, annuity providers can pool the mortality risk of many individuals and use the resources of early decedents to continue making payments to those who live a long time. As will be noted in section 4 below, there is some aggregate mortality risk that cannot be diversified away by risk pooling, a fact that may partly help to explain higher than actuarially fair prices of annuities. Nonetheless, the pooling of the idiosyncratic component of mortality risk provides an opportunity for insurers to pay a mortality premium to individual annuitants conditional on survival.

Another way to view the attraction of annuities is that an annuity is able to provide a higher level of sustainable lifetime consumption than is available from otherwise similar, but unannuitised, assets. To see why this is possible, consider a simple example from Brown (2007) in which an individual without a bequest motive cares only about his consumption in the current period and one period in the future. If this individual invests \$1,000 in a non-annuitised asset with an 8 percent rate of return, in the next period he will be able to consume \$1,080. On the other hand, if he invests \$1 in an annuity, and if with probability 0.03 the individual will not survive to receive the payment next period, then the insurer



**Table 1. Estimates of the average effective age of retirement for men**

	1970-75	1980-85	1990-95	2000-05	Difference (2000-05 minus 1970-75)
Australia	65.8	62.6	62.3	63.7	-2.0
Austria	..	..	0.0	59.1	n/a
Belgium	63.5	60.6	58.3	59.3	-4.2
Canada	65.4	63.6	62.5	63.3	-2.1
Czech Republic	..	..	..	61.5	n/a
Denmark	65.9	65.9	62.9	64.1	-1.9
Finland	66.5	63.0	60.1	60.5	-5.9
France	..	..	59.3	58.5	n/a
Germany	..	..	..	61.7	n/a
Greece	66.5	65.2	63.2	62.4	-4.1
Hungary	66.3	64.0	62.1	58.9	-7.4
Iceland	..	71.0	70.2	68.5	n/a
Ireland	70.3	66.1	63.2	65.2	-5.1
Italy	63.9	63.3	60.5	60.4	-3.5
Japan	71.2	69.7	70.7	69.0	-2.1
Korea	66.4	66.8	70.5	70.4	4.0
Luxembourg	61.8	59.8	59.3	59.2	-2.7
Mexico	80.5	78.2	72.8	73.3	-7.2
Netherlands	64.1	60.9	61.1	60.2	-3.8
New Zealand	66.7	63.6	63.2	65.8	-0.9
Norway	67.4	67.7	65.3	63.9	-3.5
Poland	70.3	66.5	63.8	61.3	-9.0
Portugal	71.2	66.5	63.3	66.2	-5.0
Slovak Republic	..	..	..	59.2	n/a
Spain	66.8	63.5	60.8	61.1	-5.7
Sweden	66.2	64.3	62.7	65.5	-0.7
Switzerland	70.7	68.3	67.1	65.2	-5.5
Turkey	78.8	67.4	65.4	64.1	-14.7
United Kingdom	67.4	62.8	62.0	63.2	-4.1
United States	66.9	65.8	64.2	64.5	-2.3

**Source:** OECD Calculations based on the results of national labor force surveys, the European Union Labor Force Survey, and for earlier years in some countries, national censuses. Numbers in italics are considered by the OECD to be less reliable because they are derived from interpolations of census data rather than from actual labor force surveys.

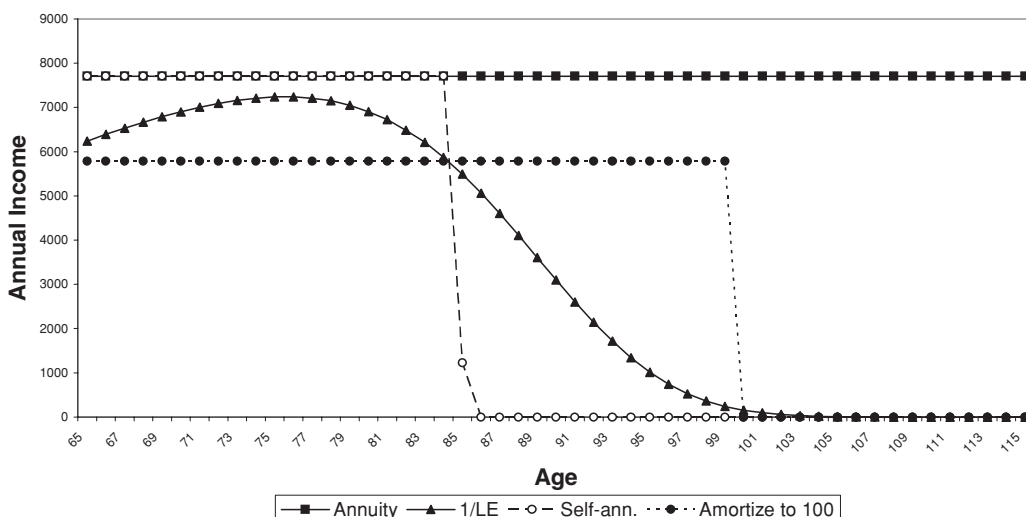
is able to pay  $\$1,080/(1-0.03) = \$1,102$  to the annuitant, conditional on survival. The extra return provided to surviving annuitants is sometimes called the “mortality premium” or “mortality credit,” because it is provided in return for giving up one’s right to the wealth upon death. For an individual who does not value bequests, the fact that the rate of return on the annuity is greater than the rate of return on the non-annuitised asset for individuals who survive should lead to annuitisation.

This potential for higher returns can be seen in Figure 1, which shows the amount of income that would be available to an individual under several

alternative strategies for converting one's nest egg into retirement income.<sup>3</sup> The "annuity" line shows the \$7,704 of annual income that would be available for life to a 65-year-old man who purchased a standard life annuity contract with an initial premium of \$100,000. This strategy is then compared to three alternatives. The "self-annuitisation" alternative shows an individual who invests his \$100,000 in a non-annuitised account earning the market rate of interest but who consumes the same \$7,704 per year in income that the life annuity would have provided. Because this individual is not benefiting from the mortality premium, this strategy is unsustainable: he would run out of money at age 85.

The "amortisation" line shows another case in which the individual invests his wealth at the going market interest rate and "amortises" it (i.e., spreads it evenly) over 35 years, from age 65 to 100.<sup>4</sup> This strategy provides income that is nearly 25 percent lower than that provided by the annuity. Furthermore, the amortisation strategy still imposes some risk; in the event that the individual lives beyond age 100, he would have no money left to consume under this approach, whereas he would still have income if he had purchased a life annuity. The "1 / LE," or "one divided by life expectancy," line shows what happens if an individual follows a more "sophisticated" draw-down strategy that is similar to one of the methods permitted by the IRS for meeting minimum distribution requirements from qualified pension plans. In particular, the strategy is based on consuming a fraction of remaining wealth that is proportional to the individual's remaining life expectancy.<sup>5</sup> The important feature of this approach is that, once again, the income stream is always lower than that provided by a life annuity. Indeed, the income from this approach never exceeds 94 percent of the annuity income level, and falls to less than 40 percent by the time a person is in his or her early 90s.

**Figure 1. Income from alternative payout strategies**



This insight has been formalised in a number of economic studies, starting with the seminar work of Yaari (1965). By modeling a stylised life-cycle consumer with no bequest motives and an uncertain date of death, he showed under fairly restrictive conditions that a risk-averse consumer would rationally annuitise 100 percent of her wealth. Subsequent research quantified the welfare



gains, and found them to be substantial. For example, Mitchell *et al.* (1999) found that a 65 year old male facing average U.S. population mortality risk would be willing to give up approximately one-third of his wealth in order to gain access to an actuarially fair annuity market. A recent theoretical contribution by Davidoff, Brown and Diamond (2005) refined and extended Yaari's result by presenting sufficient conditions under which full annuitisation remains optimal, conditions which are substantially less restrictive than what had been previously shown. In addition, they illustrate the central importance of "market completeness," and how the full annuitisation result may break down if some desired consumption paths are not available when all wealth is annuitised. As will be discussed in the next section, we know that annuity 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. Even so, some economic simulations suggest that, even when the mismatch is severe, many consumers would still find it welfare-enhancing to hold the majority of their wealth in an annuitised form. Other papers find that the degree of market incompleteness may be sufficiently severe, at least in some countries, to drive the demand for annuities in the private sector to very low levels. These studies will be discussed in more detail below.

### 3. Annuity markets in the OECD

In every OECD country, public sector pension / Social Security systems provide significant annuitised income to most retirees. For example, the OECD (2007b, p.32) reports that "for workers at average earnings, the average for the OECD countries of the gross replacement rate from mandatory pensions is 58.7%," although there is wide variation across countries. While not all mandatory pension programmes are fully annuitised, the degree of annuitisation arising from the public sector is substantial in many countries.

In contrast, voluntary annuitisation is quite low in across OECD countries. Indeed, as noted by Lindeman and Yermo (2002), "except in a few OECD countries, annuities markets either do not yet exist or are still in an incipient stage of development." The United Kingdom is often singled out as an exception to this rule, owing to the fact that the UK has a well-developed annuity market. However, there are really two distinct private annuity markets in the United Kingdom. The compulsory market arises from the fact that participants in private defined contribution plans are required to annuitise at least part of their lump-sum by age 75. The voluntary annuity market is comprised of individuals using non-pension wealth to purchase annuities from insurers. As noted by Finkelstein and Poterba (p. 32), "the compulsory market is much larger than the voluntary market ... annual payments to voluntary annuitants in 1998 were only £0.8 billion."

While the institutional structures in the United States are quite different from the U.K., the substantial difference in the degree of annuitisation across the pension and voluntary market exists in the U.S. as well. In the employer provided pension market, it used to be commonplace for pensioners in the United States to receive their defined benefit benefits in the form of an annuity. As the pension landscape in the U.S. has shifted away from DB plans and toward hybrid plans and DC plans, however, the extent of annuitisation had dropped markedly even within the pension world. Among those DB plans that

still exist, Salisbury (2002) points out that over half of them now offer a lump-sum benefit at retirement. In addition, he reports that “nearly all of the over 500” cash balance, or hybrid, plans offer lump-sum distributions as a payout option. According to Hewitt Associates, the fraction of 401(k) plans (currently the most common employer-provided plan in the U.S.) offering annuities as a payout option fell from 31 percent in 1999 to only 17 percent in 2003. As a result of these three factors, the Congressional Research Service (2005) reports that 85% of the 61.1 million workers age 21 or older who were included in a retirement plan at work participated in a plan that offered a lump-sum distribution as a payment option.

The non-group, voluntary market for individual immediate annuities in the U.S. is quite small. In 2005, only \$11.8 billion flowed into individual immediate annuity contracts of all kinds (NAVA, 2006). Because this number includes products which are not life-contingent annuities (*e.g.*, products that pay out for a specified number of periods), the size of the voluntary life annuity market is even smaller. As discussed by Brown (2007), “the conclusion that the market is small is supported by standard household data sets that are used to track asset ownership, such as the Survey of Consumer Finances or the Health and Retirement Study. The frequency with which annuity owners appear in these data sets is so low that empirical work on private market annuity purchases in the United States has been severely limited.”

Small private annuity markets are the norm in most OECD countries. MacKenzie (2006, p.27) reports that “annuities markets in France, Germany, Italy and Japan are small.” In a study examining the Australian annuity market, Knox (2000) reported that “the market for private life annuities with longevity insurance is very small.” A recent IMF (2007) study of the pension annuity market in Mexico in the decade following the 1997 pension reform reports that “the pension annuity market in Mexico is very small. This is due to the fact that the pension reform that created it was conducted only in 1997 and because the Mexican insurance market in general has low penetration and density.” A study of annuity markets across the OECD comes to the general conclusion that there is an “apparent paradox in the findings: despite good value for consumers, demand for annuities remains weak” (Lindeman and Yermo, 2002). A discussion of the possible reasons for the limited market size is provided in sections 4 and 5.

#### **4. Why are annuity markets small? A review of the “rational” economics literature**

The international evidence on the small size of markets for voluntary annuitisation is extremely robust. What the evidence on market size does not indicate, however, is *why* so few annuity market transactions take place. In the broadest possible terms, there are two potential explanations for the small size of the market: either supply is limited or demand is weak (or both). On the supply side, markets may be limited due to high prices, arising from loads, adverse selection or aggregate mortality risk. Markets may also be incomplete, failing to provide products with inflation protection, equity market exposure, or the ability to access equity market returns. Markets may also be incomplete in the sense of providing too little liquidity.

On the demand side, there are several “rational” reasons that demand may be limited, over and above the effect of supply-side limitations. For example, individuals may already be sufficiently, or even excessively, annuitised by compulsory annuitisation of first or second pillar pensions. Alternatively, individuals may simply not value formal annuity markets due to having strong bequest motives or because informal, family substitutes for formal annuity markets exist. In addition, there is a large number of “behavioural” factors that may limit demand, a subject that will be explored in more detail in section 5 below.

Understanding what drives the limited annuity market size is critical for evaluating whether policies to promote annuitisation are desirable and, if so, which types of policies are likely to be most effective. For example, if research were to indicate that individuals have a strong latent demand for appropriately designed and priced annuity products, and that the small size of the market was due to supply constraints, then the appropriate focus of policy discussions might be to remove regulatory or other barriers to product innovation. Alternatively, if research suggests that the lack of demand for annuity products is perfectly rational because individuals are adequately protected from longevity risk due to formal and informal risk sharing mechanisms, then the appropriate policy response might be to do nothing. If, however, research suggests that the small market is driven by limited consumer demand, and that this limited demand is based on behavioural biases rather than fully rational reasons, the public policy may be most usefully focused on policies that educate consumers to overcome these biases (e.g., financial education programmes), utilise behavioural biases to “guide” consumers into annuity products (e.g., the use of default options), or even force individuals to annuitise through compulsory programmes. It is quite possible, of course, that annuity markets around the world suffer from limitations from multiple sources, thus requiring a multi-faceted policy response if annuity markets are to grow in the future.

Section 4.1 explores potential supply-side limitations to annuity markets, while section 4.2 explores potential demand-side explanations that fit within a strictly rational framework. Demand-side limitations stemming from behavioural biases will be discussed in section 5.<sup>6</sup>

## **4.1 Supply-side limitations to annuity markets**

### *4.1.1 High prices: administrative costs, adverse selection and aggregate risk*

Yaari’s (1965) seminal contribution on the theory of the life-cycle consumer with an uncertain date of death showed that under fairly restrictive assumptions, consumers should rationally annuitise all of their wealth. Among the many assumptions leading to this result was that annuities are actuarially fair, meaning that the expected present discounted value of the payments from the annuity was equal to the amount of wealth used to purchase the annuity.

In practice, it is well-known that prices in voluntary annuity markets deviate significantly from actuarially fair levels, especially when the expected values are calculated using life tables representative of the mortality experience of the general population. One commonly used measure for analyzing the extent of the

divergence of actual prices from actuarially fair levels is the “money’s worth” (MW) measure, which is defined as:

$$\text{Money's Worth} = \frac{\text{Expected Net present Value of Payouts}}{\text{premium}}$$

The numerator is the sum of all future annuity payments, weighted by the probability that an individual will be alive to receive the payment, and discounted back to present at a suitably chosen interest rate. The denominator is the cost of the annuity (i.e., the “premium” paid for it). When the MW ratio is equal to 1.0, the annuity price is “actuarially fair.” When the MW ratio is less than 1.0, it indicates that annuitants will, on average, pay more for the annuity than they will receive back in (the present value of) future payments.

Over the past decade, a large number of studies have computed Money’s Worth ratios for private annuity markets in a long list of countries, including Australia, Canada, Chile, India, Israel, Singapore, Switzerland, U.K., U.S., and numerous others. While there is a fair amount of variation in Money’s Worth ratios around the world (owing to differences in pricing, mortality tables used and discount rate assumptions), the most general finding is that MW ratios tend to be significantly less than 1.0 in most countries most of the time. For example, studies in the U.S. have shown that MW ratios tend to be in the 0.85 – 0.90 range for 65-year olds when evaluated using mortality rates for the general population and discounted using a yield curve on U.S. Treasuries (Brown, Mitchell and Poterba, 2002).

There are three primary reasons that prices may be higher than actuarially fair levels. First, private annuity providers are not providing these products as a public service. Like any for-profit organisation, insurance companies must cover their expenses (including selling expenses, underwriting expenses, etc) and earn a reasonable market return on their capital.

Second, there is considerable evidence that annuity markets are subject to the forces of adverse selection. By computing the MW separately using general population and annuitant mortality tables, studies show that much of the deviation from actuarially fair price levels arises from the fact that the mortality rates of annuitants are substantially below those of the general population. These mortality differences reflect both asymmetric information about private health information and expected longevity (i.e., “active” selection) and differences in other characteristics, such as wealth and income, that are also correlated with mortality (i.e., “passive” selection”) (Finkelstein and Poterba, 2002). Additional evidence that active selection is likely to occur in annuity markets is that individuals with poor self-reported health are less likely to express an interest in annuitising (e.g., Brown 2001). Selection by mortality differences is also known to occur across annuity products, with longer-lived individuals being more likely to choose annuity products that “back-load” annuity payments (Finkelstein and Poterba, 2004).

A third potential reason that annuity prices may exceed actuarially fair levels is that insurance companies who provide the annuities may demand a risk premium due to exposure to aggregate, non-diversifiable mortality risk. Unlike idiosyncratic individual mortality risk that an insurance company can diversify by insuring multiple lives, some mortality changes are correlated across the population. For example, the “risk” of an unexpected drop in mortality rates at older ages due to a medical break-through is not a risk that an

insurance company can diversify away simply by selling more annuities. Antolin (2007) shows how historical life expectancy projections in several countries, when compared to realised improvements in life expectancies, understated the degree of mortality reduction.

While there are other ways that an insurance company can partially hedge this risk (e.g., by selling life insurance, for which the financial impact of an unexpected decline in mortality is opposite that of the impact on annuities), it is generally well-accepted that there are limits on a company's ability to perfectly hedge this risk. There is less consensus on the potential magnitude of the price effect imposed by the inability to perfectly hedge aggregate risk. For example, Antolin (2007) estimate that difficulties hedging this risk could increase the cost of pension and life-time deferred annuities by as much as 9 percent, while Brown and Orszag (2006) argue that, given observed money's worth ratios, the upper bound on the cost of aggregate risk is lower than this, at least assuming that annuity providers are fully pricing this risk. Differing views about the relative importance of aggregate risk have led to a debate in the academic and policy literature about the relative merits of government intervention, whether through the direct issuance of mortality-linked securities or through the promotion of private capital market solutions. Readers interested in this issue can find excellent discussions in Antolin and Blommestein (2007), Blake and Burrows (2001), Blake, Cairns, and Dowd (2006), Blake, Burrows, and Orszag (2002), Brown and Orszag (2006), and Friedberg and Webb (2006), among others.

Of course, while Yaari (1965) assumed actuarially fair prices, this condition is not necessary for the result that certain consumers may wish to fully annuitise. Davidoff, Brown and Diamond (2005) show that annuities remain valuable under a much weaker condition: namely that net rate of return provided by the annuity – inclusive of the mortality premium and net of any price mark-ups from administrative or selection costs – needs to be greater than the return on the non-annuitised version of the same asset. Thus, it is not enough to know that prices deviate from actuarially fair levels. If pricing were the only limitation in annuity markets, the prices would need to deviate by such a large degree that bonds would strictly dominate annuities.

From the perspective of the market as a whole, the limited demand for annuities can only be explained by prices if the market demand for annuities is very price sensitive. Several studies suggest that aggregate demand for annuities is sensitive to prices. For example, Butler and Teppa (2007) show that in Switzerland, "a majority of the retired individuals in Swiss occupational plans choose the annuity, despite the fact that the first pillar already provides a basis annuity stream in old age." Further, they show that "the annuity price is the most important determinant of the cash-out decision." Gentry and Rothschild (2007) compare total predicted annuity demand for a "hypothetical distribution of households at market annuity prices with total predicted demand if insurance loads on annuities were one percent lower. This yielded a "load" elasticity of demand of approximately 1.25 for nominal annuities and 3 for inflation-protected annuities." These estimates are subject to a number of caveats, not the least of which is that they are based on simulated demand functions rather than empirical ones.

On the other hand, the observed levels of responsiveness to annuity prices do not seem capable of explaining the very low levels of demand that we observe in most countries. Simulation work suggests that the observed loads are not sufficient to offset the utility gains from annuitisation (e.g., Mitchell *et al.*



1999). Empirically, within-country studies of the money's worth ratio show some exceptions to the general finding that Money's Worth ratios are less than 1.0, and yet we do not observe substantial annuitisation rates in the sub-groups. For example, the Butler and Teppa (2007) study of Switzerland finds that money's worth ratios are higher for women than men (and, indeed, exceed 1.0 in many cases), and yet women choose the full lump-sum payment at more than double the rate of men. In the United States, individuals are able to "purchase" additional inflation-indexed annuities at prices that are actuarially fair using population mortality rates simply by postponing the date that they claim Social Security benefits. This is because the U.S. Social Security system actuarially adjusts benefits so that delaying claiming does not result in a loss of benefits in present value. Coile *et al.* (2002), however, find that very few individuals postpone claiming.

A recent study by Brown, Casey and Mitchell (2008) finds that many near-retirement age respondents stated a preference for receiving a lump-sum in place of the annuity from Social Security, even when the lump-sum is favorably priced. This study did find some evidence of price sensitivity: a 33 percent increase in the monthly annuity payout per dollar spent on the annuity is sufficient to induce only one out of five individuals to switch their stated preference from the lump-sum to the annuity. Given that most estimates of the money's worth of annuities in the private U.S. market suggest loads in the neighborhood of 10 to 15 percent, a simplistic linear extrapolation suggests that less than 10 percent of the population would switch to an annuity if they suddenly became offered at actuarially fair prices.

Of course, actuarially unfair pricing may not simply result in consumers deciding not to purchase an annuity at all: it may also lead consumers to delay annuitisation. If prices are higher than actuarially fair levels, the Milevsky and Young (2007) show that there may be advantages to delay. For example, it may be optimal to delay annuitisation if returns on investment in the future might exceed current returns or if annuities purchased later in life are priced more favorably than those purchased earlier. Relatedly, they show that an "all-or-nothing" annuitisation decision at a single point in time is sub-optimal, and that most consumers would be better off initially annuitising a lump sum (if they do not already have this minimum level from pre-existing defined benefit pensions like Social Security) and then gradually purchasing additional life annuities over time. While this line of research is quite useful in providing guidance to financial planners about how consumers can optimise their annuitisation behaviour, it does not provide a convincing empirical explanation of why annuity markets are so small even at much older ages, when the benefits from annuitisation are more apparent.

#### 4.1.2 *Incomplete markets: lack of inflation protection*

The recent theoretical contribution by Davidoff, Brown and Diamond (2005) underscores the important role played by complete markets. In particular, if markets are complete – essentially meaning that consumers have available to them a rich enough selection of annuity products to allow them to perfectly match their desired consumption plan – then Yaari's full annuitisation survives the relaxation of a large number of restrictions on preferences, sources of uncertainty, and pricing.



In reality, of course, annuity markets are far from complete in any country. One dimension upon which private annuity markets have often been criticised by economists is that the most commonly available annuity products do not index benefits for inflation. In the U.S., for example, inflation-indexed annuities essentially did not exist in the private market prior to the introduction of inflation-indexed Treasury bonds in the late 1990s.

It does not appear to be the case, however, that the lack of inflation indexation is the primary culprit of the small market size. Over the past decade in the U.S., several companies have introduced products that are fully or partially indexed to inflation, and yet the market for these products has remained very small. Evidence from the U.K. is consistent with this. Specifically, inflation-indexed products have been available in the U.K. for many years, and yet they represent a very small share of the overall annuity market (Finkelstein and Poterba, 2002). This is not altogether surprising from the perspective of the fully rational consumer model, however. Simulation work shows that while fully rational, risk-averse consumers should value inflation-indexed annuities more highly than nominal annuities, the value of nominal annuities remains high even in the presence of inflation risk (Brown, Mitchell and Poterba 2002).

The recent study by Brown, Casey and Mitchell (2008) also casts doubt on the centrality of inflation concerns as an explanation for limited annuitisation. When consumers were given a choice between an inflation-indexed annuity from the U.S. Social Security system and a lump-sum, the majority of respondents preferred the lump-sum payment.

#### 4.1.3 *Incomplete markets: lack of equity market exposure*

Another potentially important form of incomplete markets is the inability in some markets to access equity returns in an annuitised form. Horneff, Maurer and Stamos (2006) derive the optimal portfolio choice in a life cycle model when households face mortality risk and capital market risk, as well as labor market risk. They allow for fixed life annuities in a realistically calibrated life-cycle allocation problem. This approach highlights the trade-off between the loss of flexibility imposed by the fixed annuity and the positive mortality premium that the annuity provides. In a stylised model that ignores pricing loads, they find that individuals will begin investing in annuities at very early ages (20) as long as they have sufficient financial wealth, and that by age 50, annuities crowd out bond investments. By age 78, they find that annuities crowd out stocks as well. Once pricing loads are introduced, annuity purchases are postponed until closer to retirement age (or beyond if the person has limited financial wealth). The key difference from prior studies on life-cycle asset allocation is that the consideration of mortality risk results in individuals gradually shifting out of stocks and into annuities rather than into bonds at older ages.

Inkmann, Lopes and Michaelides (2007) study the demand for annuities in a life cycle model in which consumers can access equity market returns only by investing in stocks because only fixed life annuities are available. They report that “households optimally choose not to buy an annuity if they realise they can have access to the stock market. The flexibility associated with investment in the stock market rather than locking into the fixed annuity payout seems to be an intuitive explanation for a number of households choosing not to buy an annuity.”

As noted by Davidoff, Brown and Diamond (2005), there is no theoretical reason that equity exposure cannot be provided in an annuitised form. However, this form of market incompleteness appears to be empirically relevant in the U.K., where few annuities appear to be available that allow investors to access equity market returns in an annuity product. Using U.K. micro data, Inkmann, Lopes and Michaelides show that under reasonable (estimated) parameters about preferences, it is possible to simulate extremely low levels of demand for fixed annuities when markets are incomplete in this manner.

It is unclear whether this form of market incompleteness is a plausible explanation of limited annuity demand in the U.S. One of the leading annuity providers in the United States – TIAA-CREF – has long provided annuity products with payments that are linked to an underlying diversified portfolio. While TIAA-CREF participants, who are overwhelmingly from the education sector, have historically high rates of annuitisation, much of this was driven by employer rules that mandated or encouraged annuitisation. As these rules have loosened over the years, TIAA-CREF has seen a significant decline in annuitisation rates (although the rate remains high by most standards). Whether or not TIAA-CREF's above average rate of annuitisation today is attributable to the availability of variable payouts or due to any number of other differences between the TIAA-CREF participant population and the general population has not been firmly established.

The U.S. is also notable for having a very large market for “variable annuities.” However, as noted by Brown and Poterba (2006), variable annuity products have been sold historically on the basis of providing tax advantages during the asset accumulation phase. Because very few consumers converted the balance of these plans to a life annuity at retirement, the growth in the variable annuity market in the U.S. has not traditionally been considered a useful measure of the demand for payouts that insure against longevity risk.

In the last few years, however, there has been a strong and growing demand for variable annuities that offer minimum retirement income guarantees, such as a “guaranteed minimum withdrawal benefit,” or GMWB. Numerous industry sources indicate that a large and increasing fraction of contracts include such income options. For example, Prudential Financial (2006) reports that the GMWB option was available on nearly 80 percent of the variable annuities sold in the first quarter of 2006, up from 44 percent in 2003. A GMWB guarantees that the individual buying the variable annuity will be credited with at least a minimum rate of return even if equity markets decline. If the annuitant chooses a lifetime withdrawal plan, the monthly income is based on either the higher of the actual account value or the guaranteed value. Many companies provide options for the account value upon which the income withdrawal is based to “reset” at a higher level at specified intervals or at specific points in time.

Unlike a true life annuity, these products allow account balances (if any) to be left to one's heirs after death, and therefore do not pay a “mortality premium.” As a result, the amount of income that is guaranteed by variable annuities with a GMWB is lower than what a fixed life annuity would provide. Nonetheless, there is a “life-annuity” aspect to these products: the products guarantee that the individual will receive the withdrawal income for life, “even if the combination of annual withdrawals ... and adverse market performance deplete the account” (Herschler, 2006). Therefore, these products do provide guaranteed lifetime income, and can be viewed as serving the same purpose of a life annuity. While the growth in this market has been substantial in the U.S., it

is still too early to tell whether these products will become so popular as to essentially eliminate concerns about the annuity puzzle in the U.S.

#### 4.1.4 Incomplete markets: illiquidity and insuring multiple shocks

A closely related form of market incompleteness that has been posited as a potential explanation for the lack of annuitisation is that fixed annuity contracts impose a substantial degree of illiquidity on annuitants. Primarily due to concerns about dynamic adverse selection, most annuity providers do not permit annuitants to substantially alter the timing of annuity payouts once they have begun. Annuitants cannot easily borrow against future annuity payments, nor can they easily reverse an annuity purchase.

Koijen, Nijman and Werker (2007) emphasize the role of illiquidity of annuities in a life-cycle model. In a model that allows for time varying interest rates, inflation and risk premia, along with mortality risk, they show that consumers optimally will allocate wealth at retirement to a mix of nominal, inflation-indexed, and variable annuities depending on the state of the economy. Among the many contributions of their paper, they show that the welfare costs of annuity market incompleteness are quite significant. Relative to an optimal annuity portfolio that provides access to all three types of annuities, the authors find that if the portfolio choice is restricted to inflation-indexed annuities, even conservative investors suffer a welfare loss of nearly 10 percent. Restricting choice to only nominal annuities results in even greater losses, ranging from 22 to 55 percent.

Concerns about liquidity also arise frequently in the economics literature in the context of health care expenditures, and long-term care in particular. Davidoff, Brown and Diamond (2005) note that if expenditures are concentrated very late in life, then annuities might be an effective way to save for such expenditures. However, if the expenditures come early in life, this risk may reduce the value of annuities because the illiquid nature of the annuity renders those resources unavailable to pay for care. Sinclair and Smetters (2004) and Turra and Mitchell (2005) analyze the effect of medical expenditure shocks on annuity demand, and find a strong negative effect.

As noted by Brown (2007), however, “forgoing annuitisation 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.” Murtaugh, Spillman and Warshawsky (2001) propose combining longevity insurance and long-term care insurance in a single product. Not only does such a combination product address concerns about liquidity in the face of medical expenditures, but it also has the potential benefit of improving pricing, relative to offering the two products separately, because the selection effects may be partially offsetting. Such products have only recently begun to be offered in the U.S., so it is too early to know whether they will prove popular.

Liquidity need not be limited to medical needs. At least one insurance company in the U.S. offers a fixed life annuity with an option to withdraw, on a one-time-only basis, up to 30 percent of the expected value of the remaining annuity payments based on mortality rates at the time of purchase. This option is limited to being exercised only on the fifth, tenth, or fifteenth anniversary of the first payment or upon a “significant, non-medical loss” (Warshawsky, 2007). It is not yet clear whether the potential for adverse selection in this context has affected the pricing in a significant way.

#### 4.1.5 Risk of annuity provider default

Babbel and Merrill (2006) analyze individual annuity demand when there exists the possibility of default by the insurer that is issuing the annuities. They find that “even a little default risk can have a very large impact on annuity purchase decisions.” Essentially, the risk of “losing everything” has a substantial negative impact on annuity demand for rational, risk averse consumers. However, the authors also find that “state insolvency guaranty programmes can have a big impact upon the levels of rational life annuity purchases – particularly annuities of large size. This occurs even if the guaranty limits are relatively low. Higher guaranty limits have a much smaller incremental impact on annuity purchases.” In the U.S., all states have some form of state guaranty fund, with the coverage amounts ranging from \$100,000 to \$500,000, suggesting that the risk of insolvency cannot explain the complete lack of voluntary annuitisation among the majority of households.

#### 4.1.6 Summary of supply-side limitations

There is no question that annuity markets in most countries are imperfect, suffering from higher than actuarially fair prices and from limited availability of some product features. Even so, it is difficult to conclude that these factors are of first-order importance in explaining limited annuitisation. The failure of consumers to show interest in annuitisation even when it is attractively priced and when new products address concerns about inflation-indexation or equity exposure suggests that “something else” is responsible for the lack of annuitisation. That “something else” must presumably be a demand-side explanation.

### 4.2 “Rational” demand-side limitations to annuity markets

Economists have offered no shortage of possible solutions to the annuity puzzle within a rational life-cycle framework. This section reviews and analyzes these hypotheses.

#### 4.2.1 High levels of annuitisation from mandatory pension schemes

In standard models of a risk-averse, life cycle consumer, the marginal value of annuitisation declines as the fraction of wealth annuitised increases. Many studies (*e.g.*, Mitchell *et al.* 1999, Dushi and Webb 2004, Inkmann *et al.* 2007) have noted that high levels of annuitisation from mandatory annuitisation schemes (such as first pillar public pensions) ought to reduce the demand for annuities from the private market. There seems to be little question that this ought to be true for individuals with very high replacement rates. In some countries, however, the replacement rate from compulsory annuitisation schemes is quite low, especially as one moves up the income distribution in systems with progressive first and/or second pillar benefits.

While there is little reason to doubt that public annuity provision partially crowds out private annuity markets, this does not imply that private markets should be as small as they are. First, there is tremendous heterogeneity across countries in the extent to which individuals are subject to compulsory annuitisation, and yet we do not observe significantly larger voluntary annuity markets in countries with smaller compulsory annuitisation



systems. Second, within some countries there is a wide variation in the extent to which retirement resources are annuitised. As Hu and Scott (2007) note in the U.S. context, “it would be a miraculous coincidence if the optimal partial annuitisation strategy equaled the amounts provided by Social Security and defined benefit pensions for the vast majority of retirees.”

#### 4.2.2 Strong bequest motives

In a standard life annuity product, payments cease upon the death of the annuitant(s). Thus, if an individual wishes to leave an inheritance, she will not wish to annuitise 100 percent of her wealth. This is why the classic “full annuitisation” result assumed that there are no bequest motives (Yaari, 1965). However, as has subsequently been discussed by Davidoff *et al.* (2005), under certain assumptions, an individual should optimally divide their wealth between “consumption” and “bequests” and then fully annuitise that part of wealth that is set aside for consumption. As such, while having bequest motives nullify the full annuitisation result, the demand for annuities remains high for that part of wealth set aside for consumption. Indeed, if the individual is risk averse over the size of the bequest, then annuitisation is particularly important as it insures that the individual will not need to tap into the bequest assets to support her own consumption. As noted by Brown (2007), “in the absence of annuitisation, the size of the bequest becomes a draw from a very disperse distribution—for example, the bequest might be quite large if the individual dies young, but quite small if the individual dies at age 95.”

There is very little empirical evidence supporting that strong bequest motives significantly influence annuity decisions. Using the U.S. Health and Retirement Study, Brown (2001) found that self-reported measures of the strength of the bequest motive were not correlated with stated intentions about whether one was likely to annuitise defined contribution account balances at retirement. Similarly, Johnson, Burman and Kobes (2004) found that older adults with children are equally likely to annuitise as older adults with no children. Using data from Switzerland, Butler and Teppa (2007) indirectly test for how bequest motives influence annuity demand by comparing annuitisation rates of never married women to divorced/ widowed women and find no indication for the existence of a bequest motive.

Bequest motives are sometimes suggested as the reason for the popularity of period certain guarantees among those individuals who do annuitise. These products guarantee that the annuitant and/or the policy beneficiary will receive a minimum number of payments even if the annuitant dies shortly after purchasing the annuity. Such guarantees, however, do not seem to be plausibly explained by bequest motives due to the odd distribution of bequests that results from such a contract. As discussed by Brown (2007): “Suppose, for example, that an individual purchased an annuity with a monthly payout of \$1,000, and a ten-year period certain guarantee. If the annuitant dies immediately after purchasing the annuity, the beneficiary receives 120 payments of \$1,000. If the annuitant dies after one year, the beneficiary receives only 108 payments of \$1,000. At the end of ten years, the beneficiary receives nothing. Standard parameterisations of a bequest motive (whether a “warm glow” model or an altruistic model) have difficulty explaining why this particular distribution of bequests would be optimal. If there is any risk aversion over the size of the bequest, it is easy to show that a guarantee is dominated by purchasing a \$1,000 per month annuity with no guarantee and using the savings

from the reduced annuity premium to make an immediate gift to the beneficiary. Indeed, if there were any load paid on the guarantee, even a risk-neutral recipient would prefer the immediate gift.”

#### 4.2.3 Risk sharing within families

Kotlikoff and Spivak (1981) were the first to note that when multiple individuals, such as family members, share a common budget constraint, this can serve as a partial substitute for a formal annuity market. By pooling their resources, families are able to capture a large share of the welfare gains that are obtainable from an annuity market. As a result of this risk sharing potential, Brown and Poterba (2000) show that a couple’s willingness to pay for joint and survivor annuities is substantially lower than a single individual’s willingness to pay for an annuity.

#### 4.2.4 Tax treatment

The tax treatment of annuitised income relative to the tax treatment of lump-sum or phased withdrawals may also influence the demand for annuity products. For example, Yoo and de Serres (2004) provide a comprehensive discussion of the tax treatment of private pension savings in OECD countries and finds significant variation in the extent to which annuitisation is encouraged or discouraged by its relative tax treatment. For example, the authors indicate that “the United Kingdom, Ireland, Spain, France, Mexico and Turkey allow a partial tax-free withdrawal of benefits in the form of a lump sum, while France, Germany and Turkey allow a similar tax privilege to annuity pension income.”

It would seem that governments would have a clear interest in encouraging – or at least not discouraging – annuitised withdrawals, both because of a paternalistic concern for individual welfare and because of the potential to reduce the moral hazard concern that individuals might exhaust their personal resources too quickly and turn to publicly provided social assistance programmes for financial support. To the extent that non-annuitised withdrawals have any tax advantage over annuitised withdrawals, this fact obviously works counter to that interest.

#### 4.2.5 Summary of demand-side explanations

It is likely the case that each of these demand-side explanations has some merit. While no single explanation is capable of explaining the extent of limited annuity demand, Dushi and Webb (2004) combine high prices, high levels of pre-existing annuities, and risk sharing within couples in one model, and use this model to simulate annuity demand for individuals in the Health and Retirement Study (HRS). They find that it is possible to generate low levels of annuitisation, suggesting that while some factors may be inadequate to explain limited annuity demand in isolation, a combination of factors may have more success. In essence, they suggest that the annuity market may suffer “death by one thousand cuts.” Importantly, however, this approach to explaining the annuity puzzle has counterfactual implications of its own. For example, the Dushi and Webb paper suggests that annuity demand should be higher for single individuals than for couples, and that we should therefore observe individuals choosing to annuitise upon the death of a spouse, and yet we do not.



More generally, the heterogeneity of consumer preferences with regard to the above factors suggests that a “one size fits all” approach to product design may not appeal to many consumers. Thus, there is a tension between provide annuity products that are flexible enough to meet consumer needs (e.g., different starting ages, different payout paths, the presence/absence of guarantees, etc.) with the need to keep products simple enough to avoid consumer confusion. As the next section will suggest, most consumers do not approach the retirement income decision with a high level of financial literacy, and thus may have difficulty sorting through a complex array of product characteristics.

## 5. Financial literacy, behavioural biases, and the demand for life annuities

### 5.1 General evidence on financial literacy

A large and growing body of evidence suggests that a large segment of the population around the world exhibits poor financial knowledge. Lusardi and Mitchell (2007a) provide a review of the evidence on financial literacy in several countries. Much of this literature shows that large fractions of individuals are unable to make simple financial calculations, such as compound interest, and have a poor understanding of basic financial products. Poor financial literacy has been documented in a wide range of countries (e.g., Australia, Germany, Japan, Korea, New Zealand, U.K., and U.S.)

Prior research conducted for the OECD found that “the level of financial literacy is low in most countries, including in developed countries. In Japan, for instance, 71% of adults surveyed knew nothing about investment in equities and bonds, while surveys in the US and Korea found that high school students failed a test designed to measure students’ ability to choose and manage a credit card or save for retirement. Perhaps more worryingly, consumers often overestimate how much they know” (OECD 2006).

As an example of this overconfidence, Lusardi and Mitchell (2007a) and the OECD (2006) note that an Australian survey of some 3,500 randomly chosen respondents age 18+ found that “67% of respondents said they understood compound interest, but a mere 28% were rated as having a “good level” of comprehension when faced with an actual problem to solve.” Similarly, in the 2004 Health and Retirement Survey of U.S. Baby Boomers, Lusardi and Mitchell (2007a) found that even among those respondents who were able to answer a simple percentage calculation or a simple division problem correctly, only 18% correctly computed compound interest over two years.

There is ample evidence that the lack of financial knowledge and financial literacy is relevant to the context of retirement planning. For example, Bernheim (1998) suggests that levels of financial literacy are too low for most households to be able to make appropriate saving decisions. In recent work, Gustman, Steinmeier and Tabatabai (2007) report that only 49 – 62% of respondents (depending on the year, and the survey) identify their employer pension plan type (i.e., DB or DC) consistently with what documents from the plan sponsor indicate. Lusardi and Mitchell (2007b) find that those who are more financially knowledgeable are more likely to plan for retirement, even after controlling for a number of other factors, including level of education. A survey

in Singapore found that only 24 percent of individuals had calculated how much money they would need when they retire (Tan 2006).

A much more difficult question is whether financial education programmes are effective at increasing levels of financial literacy and leading to better financial decisions. It is quite difficult to identify a causal effect of voluntary financial education programmes due to the fact that individuals who self-select into such programmes may be more financially literate to begin with. To overcome these selection problems in the context of savings programmes, Bernheim, Garrett and Maki (2002) study the how differences in *mandatory* education programmes in high school influence financial decisions and outcomes later in life. They find that self-reported savings rates are higher for students exposed to a financial education mandate than those there were not exposed to such a mandate. Consistent with this, they found that net worth was also higher among those students exposed to the financial education mandate.

The workplace is another arena in which individuals are sometimes exposed to financial education in a quasi-experimental way. Bayer, Bernheim, and Scholz (1996) provide evidence that more frequent exposure to financial education seminars increases participation in voluntary savings plans, as well as contribution levels. The increase in participation rate was strongest among lowest-wage employees. The authors acknowledge that these effects are not likely due to financial education in isolation, but rather financial education in conjunction with the opportunity and institutional infrastructure for applying the new knowledge.

While these studies, and others, suggest that financial education can be effective at increasing savings rates and participation rates in voluntary savings plans, the state of knowledge in this area remains limited in several key respects. First, we know very little about whether some types of financial education are more effective than others. Second, there has been very little done in the way of “cost-benefit analysis” of financial education programmes, an important shortcoming given that many approaches to improving financial literacy (*e.g.*, mandatory programmes) may be quite expensive. Third, most of the rigorous studies to date have focused on savings decisions: there does not appear to be any rigorous research analyzing how financial education influences retirement payout, or annuitisation, decisions.

## **5.2 Education, financial literacy and annuity demand**

Because financial literacy influences a wide range of economic behaviours, it is natural to assume that it is likely to influence annuitisation decisions as well. However, there is very little empirical research specifically focused on how financial literacy influences the decision to annuitise.

The evidence on proxies for financial literacy is mixed. For example, in a study of two defined benefit plans, Mottola and Utkus (2007) find that “lump-sum participants have demographic characteristics typically associated with higher levels of financial experience and financial literacy; annuity participants have characteristics typically associated with lower levels of financial experience and financial literacy.” They draw this conclusion on the basis of the fact that individuals choosing the lump-sum were more likely to have higher 401(k) plan balances, more likely to have higher levels of financial wealth outside of the retirement plan.

Other studies have examined the correlation between education and the receipt of annuity income. Using data from the Health and Retirement Survey in the U.S., Johnson, Burman and Kobes (2004) report “the receipt of annuity payments by the elderly from sources other than Social Security increased with education.” Because more highly educated individuals have greater access to private pensions in the U.S., however, such a finding is not particularly surprising.

A few studies have attempted to study whether level of education affects the demand for annuities, conditional on having resources to annuitise. For example, Brown (2001) studies individuals’ stated intentions about whether or not they plan to annuitise their balances in their defined contribution accounts. After controlling for “annuity equivalent wealth,” a utility-based measure of annuity valuation, he finds that education is *not* significantly correlated with planned annuity decisions.

Of course, even if education is correlated with annuity choice, this does not necessarily mean that it is being driven by financial literacy. As pointed out by Lusardi and Mitchell (2007b), level of education and the degree of financial literacy are not perfectly correlated. For example, while individuals with at least a college education are twice as likely to be able to answer a compound interest question as are individuals with only some college (and about six times as likely to answer correctly than someone with only a high school education), it is still the case that only 30 percent of college educated individuals answered the question correctly.

Two very recent studies have attempted to specifically measure the effect of financial literacy, rather than overall education level, on annuity demand. Agnew *et al.* (2008) recruited 845 individuals across a broad age range (19-89) and conducted a series of experiments about annuity choice. As part of the experiment, individuals took a financial literacy quiz that “tested basic financial concepts such as understanding the importance of saving early, specifics about financial instruments and more advanced topics like the definition of beta. The quiz was designed to achieve a wide distribution of scores in order to separate individuals into high literacy and low literacy groups.” Subjects were given \$60 to either purchase an annuity or invest in a self-chosen portfolio composed of a risk-free asset and a simulated market. If participants chose the annuity, they received \$16.77 for every round they “survived” the game. In this experimental setting, the authors find that, conditional on education, individuals in the high financial literacy group are significantly *less* likely to choose annuities. The authors hypothesise that this may be driven by “familiarity with investment vehicles proxied for by high literacy scores or by overconfidence in the ability to invest.”

In a second study, Brown, Casey and Mitchell (2008) find that more highly educated individuals are *less* likely to annuitise, but that conditional on education, more financially literate individuals are *more* likely to choose an annuity. Specifically, they fielded an experimental module in the Health and Retirement Survey, asking the following question to respondents:

*Imagine you are 65 years old, and you are receiving \$1000 per month in Social Security benefits. Suppose you were given the choice to lower that benefit by half, to \$500 per month. This one-half benefit reduction will continue as long as you live. In return, you would be given a one-time, lump sum payment of \$87,000.*

*Would you take the \$1000 monthly benefit for life or the lower monthly benefit with the lump sum payment?*

Respondents were then asked a follow-up question that either increased or decreased the lump-sum amount. Many respondents stated a preference for the lump-sum payment at the initial price, and most of those individuals still chose the lump-sum even when the lump-sum was decreased by 25 percent. The authors find that persons with higher (16+ years) of education are less likely to choose the annuity. Conditional on education, however, there seems to be some evidence that more financially sophisticated individuals are more likely to choose the annuity.

These results raise a number of interesting questions. A natural temptation among annuities scholars – who are inclined to believe that life annuities are a sensible product to include in any retirement consumption plan – is to assume that more financially literate individuals will be more likely to annuitise. But as implicitly noted by Agnew *et al.* (2008), some types of financial education may simply serve to make investors over-confident in their investment skills, perhaps leading them to believe that they can “do better” than an annuity by investing on their own.

Ultimately, it is an empirical question whether or not financial education makes individuals more or less likely to annuitise. It is quite likely that the answer will depend on the type of financial education made available. As we will see in the next section, there is some evidence that consumers are significantly more interested in annuities when presented in a consumption frame rather than as an investment product. If so, it may be that financial education that is focused primarily on “how to invest” could make individuals less likely to annuitise, while financial education focused on “how to provide secure retirement income” could make people more likely to annuitise. Currently, these questions are under-researched and poorly understood.

### 5.3 Framing

In a variety of experimental settings, psychologists have found that individuals make decisions not based solely on material consequences, but rather interpret the consequences through a particular “frame.” A recent paper by Brown *et al.* (2008) suggests that individuals might be easily influenced by how the features of annuities, in comparison with alternative investments, are framed. In the standard, fully rational model, individuals are assumed to be making lifelong decisions about how to best allocate resources to equate the marginal value of consumption in every period of life. In this setting, the authors note that “annuities provide valuable insurance by transferring resources from states where resources have no value (death) to states where resources provide utility through consumption.” The authors then propose that “instead of viewing the problem through the *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) ... Consumers effectively isolate one choice (how to invest) from others (how to consume) and focus on specific features of this choice rather than viewing it as part of a broader, integrated set of choices.” In an investment frame context, the authors note that an annuity appears *riskier* than alternative investments, because the expected return depends on an uncertain date of death. This

distinction is the key insight of their hypothesis, namely, “under the consumption frame, the annuity is attractive because it serves as a form of insurance. In contrast, under the narrow investment frame, the annuity is viewed as being riskier than a bond because its return depends on a random variable”. The authors further note that this framework matches the intuition provided by many industry participants that people react negatively to the fact that they could “lose money” if they were to die shortly after purchasing an annuity.

To test this hypothesis, the authors conducted an Internet survey of just over 1300 individuals. Participants were asked to rate the product choices made by hypothetical individuals, a choice set that included 2-way comparisons between life annuities and alternative investment products such as savings accounts. As described by the authors, “the essence of the test is that some of the subjects are presented these products in an investment frame, which emphasized the depersonalised return on an account by using words such as “invest” and “earnings,” describing periods in terms of years, mentioning the value of the initial investment (\$100,000 in every case), and alluding to the account value at other points in the description. The other subjects are presented these products in a consumption frame, meaning that they are told how much each product would ultimately allow its purchaser to consume and for how long, using words such as “spend” and “payment,” describing periods in terms of the purchaser’s age, and never alluding to an account or its value.”

The authors report that “when questions were presented in the consumption frame, the majority of individuals preferred the consumption stream consistent with a life annuity to the consumption streams available from other products of comparable actuarial value. Specifically, in this frame, when individuals were told that any payments after death went to charity, 72 percent of respondents preferred the \$650 per month that could be provided by a life annuity to the consumption stream from a savings account of comparable actuarial value ... in contrast, when individuals faced the same choices in the investment frame, the proportions reversed, with the majority of individuals *not* choosing the life annuity. Specifically, only 21 percent of respondents preferred an account earning \$650 each month for life (*i.e.*, a life annuity) to investing \$100,000 at four percent.”

The authors also varied the extent to which bequest motives might interact with framing. Specifically, half the respondents were told that remaining resources would go to charity (a weak bequest frame), while half the respondents were told that remaining resources would go to children (a strong bequest frame.) While the ability to leave non-annuitised money to children did reduce the demand for annuities in both the investment and the consumption frame, the roughly 50 point difference in the fraction of the people who preferred the annuity in the consumption frame versus the investment frame remained largely unchanged. The authors also found that demographic characteristics (*e.g.*, number of children, marital status, gender, etc.) influenced levels of annuity demand, but had virtually no effect on the strength of the framing effect.

The experiments conducted by Agnew *et al.* (2008), and described above, also explored the effect of framing. In these experiments, they showed participants a five-minute slide show that included one of three “manipulated conditions.” In one set, the slide show highlighted the negative features of the investment option and showed how the annuity could solve the problems that the investment



alternative created. In the second set, the slide show highlighted the negative aspects of the annuity, and showed how the investment alternative could solve the problems created by the annuity. A third set attempted to present the options in a neutral, unbiased manner.

The authors report that the biased presentations had large and significant effects on choices, and, interestingly, that the effects differed by gender. “When compared to subjects in the neutral treatment, women and men are significantly less likely to choose the annuity when presented with information negatively framing the annuity option, while only men are significantly more likely to choose the annuity option when presented with information negatively framing the investment option.” (Agnew *et al.* 2008).

If changing the way annuities are framed has potentially large effects on how consumers perceive annuities, then this casts doubt on the notion that individuals are making fully-informed, fully rational decisions about whether or not to purchase annuities.

#### **5.4 Annuities and default options**

The idea that consumers may not be making fully informed or fully rational decisions about annuitisation also receives some support from the literature on default options. As noted by Beshears *et al.* (2007), default options have been shown to influence wide range of behaviours related to retirement planning, including decisions on whether to contribute to a savings plan, how much to contribute, and how to allocate one’s portfolio. They discuss a number of possible reasons that default options may have such a strong effect on behaviour. These include: (1) it may be too complex to do the analysis required to evaluate the non-default options, (2) individuals may be “present-biased” and never get around to switching the election, and (3) individuals may view the choice of the default option as providing an implicit endorsement that the default is the most appropriate option.

With regard to annuities, Beshears *et al.* (2007) discuss an important change in the regulations about annuitisation options with defined benefit plans in the U.S. The Employee Retirement Income Security Act (ERISA) of 1974 required that the default annuity option from DB plans be a joint-and-one-half survivor annuity, unless the individual opted out of this by choosing a single life annuity with higher monthly benefits. In 1984, the regulations were amended to require an annuitant to obtain a notarised signature of his or her spouse in order to opt-out of the joint-and-survivor annuity requirement. Holden and Nicholson (1998) show that before 1974, less than half of married men chose a joint-and-survivor annuity. Following the passage of ERISA in 1974, use of the joint-and-survivor annuity rose by roughly 25 percentage points. Aura (2001) reports that the adoption of the spousal consent regulations in 1984 further increased the use of joint and survivor options by up to ten percentage points.

Butler and Teppa (2007) provide evidence that is strongly suggestive of the importance of default options on annuity choice in Switzerland. They examine the annuitisation decisions of over 4,500 individuals in ten company pension plans. In nine of the ten companies, the annuity is the default payout option (with a partial or full lump-sum as alternative options). The remaining company “provides a lump sum payment (amounting to the last working year’s salary) as the standard option.” Annuitisation rates are quite high in these plans overall: in 8 of the 10 plans, annuitisation rates exceed 50 percent. In the one company



that does not use the annuity as the default option, the annuitisation rate is only 10 percent.

A recent study by Mottola and Utkus (2007) that studies the lump-sum versus annuity decision of two large U.S. defined benefit plans questions the importance of the default option. Among participants in the traditional defined benefit plan, they find that only 25 percent of married individuals choose the annuity, versus 36 percent of single individuals. While this difference is consistent with the family risk-sharing hypothesis outlined in the prior section, it is nonetheless somewhat surprising given that married individuals must have their spouse waive the right to a joint-and-survivor annuity via a notarised, written document. The authors conclude that “when it comes to accessing their money at retirement, married participants are actively engaged decision-makers ... Married participants work actively to ‘deannuitise’ – to overcome the federally mandated default option of a joint-and-survivor annuity and choose a lump sum instead.”

### **5.5 Pessimistic beliefs about longevity**

Sheshinski (2008) points out that most studies of annuity demand assume that “individuals, when forming their consumption and retirement plans, have correct expectations about their survival probabilities at all ages.” He formally models a fully rational individual who deviates from standard life-cycle models only insofar as having beliefs about survival probabilities that are more pessimistic than what we actually observe. Because survival probabilities serve a role similar to that of a discount rate, individuals with pessimistic mortality will wish to shift consumption to earlier ages. He suggests that this “may provide one explanation of the observed small demand for annuities by young cohorts.”

It is not clear that this factor is empirically important, however. A number of empirical studies have examined how subjective survival probabilities compare to observed mortality rates in the population. In one of the first papers to explore the relation between subjective and objective mortality rates, Hurd and McGarry (1993) used panel data from the Health and Retirement study and found that (i) respondents modify their survival probabilities in sensible directions when new information (*e.g.*, the onset of disease or death of a parent) arrives, and (ii) that subjective survival probabilities have predictive power for estimating survival. Similarly, Hurd, McFadden and Merrill (1999) find that subjective survival probabilities predict mortality even after controlling for socio-economic indicators and the health conditions. These studies tend to suggest that while there is tremendous heterogeneity of subjective survival probabilities in the population, there does not appear to be any systematic or substantial bias on average. Hurd, McFadden and Gan (2003) do find that that, in a sample of individuals 70 and older, the oldest respondents have average subjective survival probabilities that are substantially higher than life tables (possibly owing to the fact that this survey excludes individuals in nursing homes and other institutions).

### **5.6 Shortsightedness**

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. Research by Warner and Pleeter (2001) estimated personal discount rates for members of the U.S. military. Over 65,000 members of the military were offered separation packages as part of a military drawdown programme in the early 1990's, and these packages offered a choice between a (non-life-contingent) annuity and a lump-sum payment. The annuity was calculated as being equal to 2.5 percent of annual basic pay multiplied by years of service, and this amount was then paid out over a non-life contingent period of time equal to two times the years of service. The second option provided lump-sum equal to 15 percent of one's pay times years of service. The dollar amounts involved were substantial: the package offered to the typical officer was worth approximately \$50,000, while the typical enlisted person was offered a package worth approximately \$25,000.

The authors calculate that the “break-even” discount rate between the annuity and the lump sum was approximately 17 percent: below this, individuals should prefer the annuity, whereas above this, they should prefer the lump-sum. It is worth noting that a 17 percent discount rate is far higher than that typically assumed in the annuities literature (or, for that matter, the economics literature more broadly). Despite the high break-even discount rate, most individuals (including over 90 percent of enlisted personnel), chose the lump-sum option. The authors estimate that there is considerable heterogeneity in personal discount rates, but that they are quite high on average, with a range from 0 to over 30 percent. Consistent with some prior studies, they also find that discount rates decline with income, education and age, among other factors.

In addition to exhibiting high discount rates, a number of studies have suggested that individuals may exhibit what economists call “hyperbolic” discount rates. As explained by Laibson (1997), “hyperbolic discount functions are characterised by a relatively high discount rate over short horizons and a relatively low discount rate over long horizons. This discount structure sets up a conflict between today's preferences, and the preferences that will be held in the future. For example, from today's perspective, the discount rate between two far off periods,  $t$  and  $t+1$ , is the long-term low discount rate. However, from time  $t$  perspective, the discount rate between time  $t$  and  $t+1$  is the short-term high discount rate.”

Whether hyperbolic discounting makes annuities more or less attractive depends on whether the hyperbolic discounters recognise their self-control problem and account for it in their current decision-making. If they do not, then the fact that they discount the future highly will lead them to put less weight on the future and thus make annuities less attractive. If they do recognise their future self-control problem, however, then they may wish to use an annuity as a “commitment device.” Essentially, by purchasing an annuity, the individual is able to allocate consumption across periods  $t$  and  $t+1$  according to today's preferences, rather than according to (short-term) preferences that will be applicable at time  $t$ .

## 5.7 Other behavioural hypotheses

In addition to research on framing and default options, a number of additional behavioural explanations have been suggested in the literature. This is not surprising, given that behavioural economics has provided new insights in the closely related areas of retirement savings, pension plan participation rates,

and portfolio decisions, among others. However, the literature on applying the insights from psychology and behavioural economics to annuity decisions is just beginning to emerge. This section briefly reviews some of the existing literature.

Hu and Scott (2007) hypothesise that loss aversion can help to explain why individuals are reluctant to annuitise. They note that, rather than evaluating the annuity as part of an overall optimisation exercise, individuals may use a narrow framing along the lines of “will I live long enough to make back my initial investment?” They argue that if one applies the cumulative prospect theory approach to a narrow framing of the annuity, annuities do not look attractive because the “losses” from the annuity (if one dies young) loom larger in the individual’s value function than do the potential “gains” from living a long time. They also argue that this approach can explain the popularity of “guarantees” among those consumers who do purchase annuities, the idea being that guarantees reduce the likelihood that an individual will experience a loss.

Brown (2007) suggests that, rather than buying insurance to payoff in periods where the marginal utility of consumption is high, consumers may use a rule-of-thumb of “I buy insurance against bad events.” In other words, individuals may want insurance to pay off when the *level* of utility is low, rather than when the marginal utility of income is high. This rule-of-thumb works well in many cases when a low level of utility corresponds to a high marginal utility (such as the case of life insurance, health insurance, casualty insurance, disability insurance and so forth). In the case of annuities, this heuristic may fail, however, if living a long time is viewed as a good outcome. There is, however, no empirical evidence to support or refute this hypothesis.

It has also been suggested that some consumers may have difficulty thinking of an annuity as an insurance product because it does not have the same “look and feel” as other insurance contracts. Specifically, many insurance contracts charge a flow of relatively small premiums in exchange for large payoffs if some triggering event occurs (*e.g.*, one’s house burns down). In contrast, an annuity requires a very large and substantial up-front premium, and then provides a flow of relatively small payments each month until a triggering event (one’s death) causes the payments to stop. Several authors (Milevsky 2005; Webb, Gong and Sun 2007; Scott, Watson and Hu 2006) discuss products that charge a much smaller premium and then payoff starting at some distant future date only if the individual survives to that date. These products, sometimes call “advanced life deferred annuities,” have become available in the U.S. For example, in 2004 MetLife introduced a product that allows a consumer to use a small portion of his wealth at age 65 to buy an annuity that does not begin paying out until age 85. Chile is currently studying the possibility of a compulsory programme in which individuals would purchase an annuity at retirement that would begin paying benefits at age 80. Because the purchase occurs at retirement, with payments delayed until an older age, this approach differs in an important way from simply mandating the purchase of an immediate annuity at older ages (such as the U.K.’s requirement that individuals partially annuitised by age 75). The “delayed” annuitisation approach may be appealing to consumers because it looks more like an insurance product: the premiums are relatively small (because the future payouts are being discounted by both interest and mortality), and offers a large payoff only if the individual survives to the age at which payouts begin. Webb, Gong and Sun (2007) and Scott, Watson and Hu (2006) report that such a product can capture a disproportionate share of the

welfare gains from annuitisation. A related product is one, such as that offered by Hartford in the U.S., that allows a person to use a portion of their 401(k) plan contributions to purchase future units of annuity income. Because individuals gradually purchase units of income, rather than accumulating wealth per se, this may also help overcome a psychological barrier of converting a large accumulated stock of wealth into income at the time of retirement.

Some authors have also suggested that “regret aversion” could play a role in the annuitisation decision. In particular, individuals might be concerned about purchasing an annuity and then subsequently regretting the decision upon learning negative news about their survival prospects. As noted by Brown (2007), “even if the probability of this outcome is very small, individuals may inflate the probability in making the annuity decision. For example, research in psychology has shown that events that are more easily imagined (*e.g.*, such as dying right after an annuity purchase) are over-weighted in the decision process. (Tversky and Kahneman 1974). However, Braun and Muermann (2003) formally model how regret aversion influences insurance demand, and finds that it leads individuals away from extreme outcomes. This suggests that regret averse individuals are less likely to fully insure, but are also less likely to have no insurance. As noted by Brown (2007), “just as individuals might regret the decision to purchase an annuity, a regret averse individual might also fear the possibility of living to age 110 after having failed to purchase one. More research needs to be done to determine whether or not regret aversion matters for the annuity purchase decision.”

There are numerous other potential behavioural explanations of the lack of demand for annuities. These could include models in which individuals are averse to “loss of control,” dislike ambiguity, or dislike thinking about unpleasant events, such as growing old or dying. As with the other hypotheses outlined above, however, much more research is needed to determine which of these factors, if any, are empirically relevant.

## 6. Policy options regarding financial education and annuities

### 6.1 The context: Is annuity demand fully informed and rational?

Broadly speaking, the appropriate role of public policy in the annuitisation arena depends crucially on whether or not policymakers believe that individuals are making appropriate and fully-informed decisions on their own. Whether financial education regarding annuitisation is likely to improve individual or social welfare is especially dependent on what is driving the observed low rates of annuitisation.

One possibility is that individuals are making fully rational decisions not to annuitise because of problems in the private annuity market that render existing products unattractive. Indeed, the literature is supportive of the fact that there are supply-side imperfections that lead to high prices and/or a limited selection of products available in many countries. If policymakers believe that these market imperfections are the primary cause of the limited market size – and that the demand for annuities would be substantially greater if these imperfections were corrected – then the most useful public policy interventions would be those that eliminated barriers to innovation in the annuity market. Such barriers might include government regulation or tax policy that



purposefully or inadvertently limits the ability of insurance companies to develop products that address consumer needs. One example would be U.S. tax rules that discouraged combination products that simultaneously insure against longevity risk and long-term care expenditures (Brazell, Brown and Warshawsky, 2007). Another example from the U.S. are regulations that impose fiduciary risk on pension plan sponsors when choosing an annuity provider coupled with there being no fiduciary risk for failing to provide an annuity option to plan participants (Perun 2004).

As already noted, however, there are many reasons to believe that supply-side market imperfections are not the primary reason that annuity markets are so small. For example, while prices tend to be much higher than actuarially fair levels in nearly every country, for some demographic groups in some countries, annuities are priced at fairly attractive rates. Yet these prices do not seem to translate into significant demand. Further, even when individuals are confronted with actuarially favorable choices between annuities and lump-sums, many individuals choose the lump-sum. With regard to market incompleteness, the availability of inflation-indexed annuities did not significantly change the annuity landscape in the U.K. or the U.S. While demand for products with guaranteed minimum withdrawal benefits is growing in the U.S., it is far too early to know whether these products will represent a significant share of aggregate retirement income in the future. On net, the international evidence suggests that it is extremely unlikely that there is substantial latent demand for annuity products that is simply waiting for product markets to become more complete.

A second possibility is that individuals are making fully-informed, rational decisions not to annuitise for reasons related to existing high levels of annuitisation from first and/or second pillar pensions, bequest motives, or other considerations. If so, then it is arguably the case that the best policy response would be one of non-intervention. In other words, lacking a compelling case that markets are failing to achieve appropriate outcomes for individuals, it is difficult to know whether government intervention would do more good than harm. However, most studies suggest that fully rational models have a difficult time explaining the lack of annuitisation, at least without creating new puzzles along the way.

A third possibility is that consumers are ill-informed, financially unsophisticated, and are making decisions about annuitisation that are individually and socially sub-optimal. While the evidence is far from incontrovertible on this point, there are numerous reasons to believe that this may, in fact, be the case. First, the economics literature is increasingly filled with studies documenting a wide range of behavioural biases that influence consumer behaviour in nearly all other aspects of the retirement income planning process. It would be highly unusual if consumers who exhibit poor financial knowledge and who make savings and investment mistakes throughout their life suddenly became perfectly rational decision-makers when evaluating options for withdrawing money from their savings plans. Second, several papers suggest that annuitisation decisions are affected by the availability of a default option, a finding that is inconsistent with a view of consumers as being perfectly informed and rational. Third, recent evidence indicates that individuals may be highly sensitive to how annuities are framed, and in particular, whether annuities are presented in a context that emphasizes

consumption features or investment features. This finding is also inconsistent with a model of perfectly rational consumers.

In summary, there is a compelling case to be made that individuals are not making fully informed and fully rational annuitisation decisions. If so, then this opens up the possibility that governments have the potential to improve individual and social outcomes through the judicious use of public policy. The next sub-section presents a number of policy recommendations that are based on this assumption.

## 6.2 Policy recommendations

### 6.2.1 Creating an environment that encourages retirement income security

**Recommendation 1:** Governments as well as public and private pension providers should emphasize that providing a lifelong source of retirement income is of equal importance to retirement security as the accumulation of wealth. As both public and private pension schemes around the world increasingly rely on defined contribution plans as a tool for promoting retirement saving, it is important not to lose sight of why individuals are saving for retirement in the first place: namely, to provide resources to finance a stream of consumption during retirement. In the presences of uncertainty about length-of-life, financial products that provide guaranteed, life-long income have an important role to play in individual retirement portfolios. Policymakers should consider proactive steps to encourage annuitisation, possibly including some of the recommendations in section 6.2.2 below.

**Recommendation 2:** At a minimum, public pensions and regulations governing private pensions should be examined to ensure that annuitisation is not inadvertently discouraged. In a variety of contexts, researchers have recognised that government and employer decisions regarding the design of retirement plans can influence behaviour in a variety of intended and unintended ways. For example, research shows that when employers provide employees with a matching contribution that is restricted to be invested in the stock of the employer, employees respond by contributing *more* of their voluntary contributions into employer stock (Brown, Liang and Weisbenner, 2007). Such behaviour is inconsistent with standard models of portfolio choice, and suggests that employees may view the employer's policy as an implicit "endorsement" of such behaviour. In the context of annuities, government regulations provide a variety of implicit endorsements of behaviour, some of which have the effect of discouraging annuitisation. For example, the tax treatment of annuities relative to non-annuitised products may not only influence the financial attraction of an annuity, but may also serve as a signal that the government favors or disfavors particular types of payouts. It is also important to ensure that private plan sponsors are not discouraged from offering annuity payout options due to concerns about fiduciary liability.



## 6.2.2 Tools for promoting income security

**Recommendation 3:** Efforts to educate the public about the importance of sustainable retirement income in the presence of longevity risk should occur throughout individuals' working lives rather than focused solely on the retirement age population. There are several reasons for this recommendation. First, the extent to which individuals effectively utilise products that insure against longevity risk has important implications for how much individuals should save. Put simply, individuals who effectively use life annuities are able to secure a higher stream of retirement consumption than individuals who do not annuitise. Therefore, the "saving" and "annuity" decisions are not separable. Second, ignoring issues of longevity risk during one's working life reinforces the "investment frame" mentality, which may then make the transition to thinking about income and consumption during retirement more difficult. After spending three or four decades exclusively focused on wealth accumulation, it may be psychologically difficult for individuals to simply give up control of their accumulated wealth in order to purchase an income stream. Third, earlier consideration of longevity risk has numerous implications for product design. For example, consumers who are thinking actively about how longevity risk influences future retirement consumption may be more apt to allocate their savings towards products which promise future income streams (e.g., products with elements of delayed annuitisation). Earlier consideration of annuitisation may also help to partially mitigate selection problems and thus improve pricing.

**Recommendation 4:** Programmes to encourage retirement income security should acknowledge, and possibly leverage, various behavioural biases that influence individual behaviour. Across a wide range of economic behaviours relevant to financial planning, consumers exhibit behaviours that are inconsistent with the behaviour of strictly rational, fully-informed economic agents. An incomplete list of examples include: consumers appear sensitive to implicit or explicit endorsements of behaviour; investors may rely on naïve heuristics for diversifying portfolios; individuals may be subject to status quo biases that limit responsiveness to changes in programmes; individuals may apply overly narrow frames to their lifetime investment decisions. Public policy decisions should recognise these and other potential behavioural biases. For example, to the extent that decisions about how to withdraw money from pension plans is subject to many of these same biases, policy makers may wish to "automate" the payout process as much as possible, rather than assuming that all individuals will rationally choose to annuitise.

**Recommendation 5:** Policymakers should consider whether the careful use of annuities as the "default option" from pensions and savings plans might be a complement to investing in financial education. Default options have been shown to be quite powerful in influencing behaviour in related contexts. Beshears *et al.* (2007) summarise the large body of evidence indicating that default options can increase participation rates in voluntary employer-provided pension plans, increase the fraction of salary that individuals save, and influence the asset allocation decisions of participants, among other behaviours. In many cases, the use of defaults can have positive welfare effects, such as when non-savers are induced to participate in a pension plan. In other cases, the (potentially unintentional) use of defaults can potentially reduce welfare, such as when the default portfolio allocation is to place 100% of assets in a low-yielding money market fund, rather than a diversified portfolio. It is important

to note that in most situations where there is choice, some option serves as a default, whether intentionally designed as such or not. The relevant policy question is whether that default option should be consciously chosen to encourage a particular behaviour, rather than having the default option selected arbitrarily.

**Recommendation 6:** Annuities should be used as a default option only if accompanied by certain “safeguards.” While annuities provide important opportunities for insuring against longevity risk, they may not be appropriate for all individuals. For example, an annuity would clearly be welfare-reducing for a terminally ill individual who has no chance of living to advanced ages. Indeed, it is for these reasons that there is an upper bound on how much compulsory annuitisation is appropriate.

Yet the very same issues that might lead policymakers to believe that a default is needed – namely, poor financial literacy among consumers – might also lead some individuals to accept the default even when it is clearly against their interest to do so. In such a case, an “all-or-nothing” annuitisation default option may suffer the same disadvantages as a compulsory programme. It is notable that this negative aspect of the default option approach is more important here than in most other contexts. For many decisions – such as whether to contribute to a savings plan or how to allocate one’s portfolio – the individual can easily reverse the default should they subsequently decide that the default option is not the best option for his or her circumstances. Traditional life annuities, however, provide a special challenge in this regard due to the largely irreversible nature of the product.

There are a number of ways that a default could be structured to alleviate some of these problems. For example, it might be possible to create a default option with two features: (1) the annuitisation could be gradual, or “laddered,” such as by converting 20 percent of the account balance into an annuity each year for five years, and (2) each segment of annuitisation could have a limited period (*e.g.*, a few months) of reversibility. In addition to helping to guard against “accidental annuitisation,” the gradual annuitisation approach also helps individuals smooth out asset price and interest rate fluctuations. Another possible default would be to make use of new products that offer a minimum income guarantee, but which provide more flexibility to consumers. For example, a number of financial services companies in the U.S. have recently introduced riders on variable annuity products that offer “minimum guaranteed withdrawal benefits” – in essence, a guaranteed minimum income – while simultaneously offering individuals with some upside exposure to equity markets while limiting downside exposure.

The key is to recognise that “no annuitisation” is surely not the optimal default option. Rather, through the creative use of existing (or yet-to-be-developed) financial products, it is likely that a default can be designed that provides a basic level of secure retirement income for most participants while preserving a degree of choice and flexibility for those who wish to choose differently.

### 6.2.3 Recommendations for designing and evaluating financial education programmes

**Recommendation 7:** Governments need to dedicate resources to evaluating the effectiveness of financial education programmes in influencing decisions regarding withdrawals during the retirement period. Governments around the world have expressed an interest in improving financial literacy, and financial education is often suggested as the pathway to achieve this goal. Despite this, “relatively few studies have attempted to estimate the effectiveness of financial education programmes in altering retirement goals or retirement savings behaviour” (Clark, et al., 2006). Those studies that do exist (e.g., Bayer, Bernheim and Scholz 1996; Clark and Schieber 1998; Madrian and Shea 2001; Lusardi 2004) focus primarily on issues related to the accumulation of assets, particularly inside employer-sponsored plans. With regard to how financial education influences decisions about how to withdraw from accumulated savings, there appears to be no systematic research whatsoever. This is a striking deficiency in our knowledge, and correcting it is a necessary condition for designing effective programmes in this area.

**Recommendation 8:** Evaluations of the efficacy of financial education programmes in this area should focus on measuring changes in behaviour, not just changes in knowledge. There are a large number of issues that an individual must consider when evaluating how to spend down his or her accumulated retirement assets. As a result, the number of dimensions along which financial education might be needed is large. For example, to make a fully informed decision, individuals need to understand the details of how an annuity or an alternative financial product works, the explicit as well as the hidden costs of purchasing such a product, and other product features. In addition, the individual needs to have some knowledge of the distribution of possible lengths-of-life (not just average life expectancy), the implications of having too few resources at older ages, as well as an understanding of other risks that he or she might face (e.g., medical expenditures, inflation). If financial education programmes are too narrowly focused, they may be insufficient to change behaviour.

**Recommendation 9:** The design and evaluation of financial education programmes must also recognise the role of framing and other behavioural biases. Given the emerging evidence about the importance of framing, the potential exists for improperly framed financial education programmes to reduce, rather than increase, the propensity of individuals to make good decisions about insuring against length-of-life uncertainty. For example, if financial education programmes are delivered in an “investment frame” that focuses on financial risk, rates of return, break-even analysis, and liquidity, this might lead individuals to dislike annuities even more. In contrast, if financial education programmes are delivered in a “consumption frame” that emphasizes the desirability of having a life-long source of income, then individuals might be more likely to purchase annuities.

**Recommendation 10:** The OECD, notably through the recently created International Gateway for Financial Education, should serve as a clearinghouse for research findings and other information relevant to the design, implementation, and evaluation of “best practices” in the area of financial education and annuitisation. While the specific institutional features of pension

and annuity markets differ around the world, there appear to be strong commonalities in the manner in which individual consumers evaluate the annuitisation decision. As policymakers, market participants, and researchers make progress in expanding our knowledge about these issues, the global dissemination of the key lessons will be important for designing workable, effective and efficient programmes.

## 7. Conclusions

The aging of the population is an issue of central concern to OECD and non-OECD governments across the world. According to “middle-of-the-road” assumptions, “the ratio of people over 65 to those between 20 and 64 could double between now and the middle of the century. And in some countries, such as Japan, Italy and Spain, this ageing will be much stronger” (Cotis 2003).

These demographic trends will place increased pressure on government budgets due to the predominance of pay-as-you-go pension and health care systems. As a result, it is likely that individual citizens will bear an increasing share of the responsibility for financing their own retirement. A critical part of that responsibility is accumulating resources during one’s work life. An equally critical part of that responsibility is making financial decisions that will ensure that one’s accumulated resources can provide for sustainable income during retirement. Financial products that guarantee a life-long income stream should therefore play an increasingly important role in individuals’ retirement planning processes.

A large and ever-growing body of academic research, however, suggests that consumers around the world have a strong aversion to annuities. This aversion is evidenced both by the small size of voluntary annuity markets around the world and by survey / experimental research that is supportive of a consumer dislike of annuities. When combined with the widespread lack of basic financial knowledge that has been documented in many countries, there are compelling reasons to believe that public policy makers should consider whether there are policies that can improve individual and social welfare outcomes in this context.

Financial education programmes are one policy lever that might prove useful in helping individuals make better decisions about retirement income sustainability. Unfortunately, there appears to be virtually no systematic or rigorous evidence showing whether financial education programmes help individuals make better asset decumulation decisions. Indeed, what little evidence there is about the correlation between existing levels of financial literacy and annuitisation decisions provides inconsistent results. Promoting research and evaluation in this area should be a priority for OECD member nations as well as other countries facing similar shifts in retirement policy.

In the meantime, policymakers may wish to consider whether appropriately designed default options can be implemented to encourage – but not require – increased annuitisation among retirees. While designing appropriate default options is more difficult for the annuitisation decision than for many other decisions, owing to the “irreversible” nature of traditional annuity products, it is quite likely that better default options can be designed. A “no annuitisation” default does not seem to be a satisfactory solution, given the important ways in which longevity risk complicates the financial planning process for most retirees.

## Notes

- 1 The author would like to thank Pablo Antolin and Flore-Anne Messy for very helpful comments on an earlier draft.
- 2 As noted by Antolin (2007), the uncertainty may be even greater than this due to the fact that the parameters underlying the life table are themselves subject to uncertainty. The extent to which this aggregate uncertainty influences annuity prices is discussed in section 4 below.
- 3 Figure 1 and the accompanying text are excerpted from Brown (2004) and Brown (2007).
- 4 This calculation uses a 35-year nominal amortization at an interest rate of 4.58 percent.
- 5 Life expectancy figures are drawn from the 2004 Social Security Trustee's Report for the 1939 birth cohort—those turning 65 in the year 2004.
- 6 It is worth noting that several other summaries of potential annuity market limitations exist, although these tend to focus primarily (although not exclusively) on rational market explanations. A good recent example from the OECD Working Papers on Insurance and Private Pensions is Stewart (2007).
- 7 Married households faced different lump-sum amounts that did not correspond directly with an actuarially fair rate.



## References

- Agnew, Julie R., Lisa R. Anderson, Jeffrey R. Gerlach and Lisa R. Szykman. 2008. "Who Chooses Annuities? An Experimental Investigation of the Role of Gender, Framing and Defaults." *American Economic Review*. May.
- Antolin, Pablo. 2007. "Longevity Risk and Private Pensions." OECD Working Papers on Insurance and Private Pensions, No. 3. OECD Publishing.
- Antolin, Pablo and Hans Blommestein. 2007. "Governments and the Market for Longevity-Indexed Bonds." OECD Working Papers on Insurance and Private Pensions, No. 4. OECD Publishing.
- Aura, Saku. 2001. "Does the Balance of Power Within a Family Matter? The Case of the Retirement Equity Act." IGIER Working Paper 202. Milan, Italy: Innocenzo Gasparini Institute for Economic Research.
- Babbel, David F. and Craig B. Merrill. 2006. "Rational Decumulation." Wharton Financial Institutions Center Working Paper No. 06-14. July.
- Bayer, Patrick J., B. Douglas Bernheim, and John Karl Scholz. 1996. "The Effects of Financial Education in the Workplace: Evidence from a Survey of Employers." NBER Working Paper No. 5655. Cambridge, MA: NBER.
- Bernheim, B. Douglas. 1998. "Financial Illiteracy, Education, and Retirement Saving." In Mitchell, O.S., Schieber, S.J. (eds.), *Living with Defined Contribution Plans*. Philadelphia: University of Pennsylvania Press, pp. 38-68.
- Bernheim, B. Douglas, Daniel M. Garrett, and Dean M. Maki. 2001. "Education and Saving: The Long-Term Effects of High School Financial Curriculum Mandates." *Journal of Public Economics* 80(3): 435-465.
- Beshears, John, James J. Choi, David Laibson, and Brigitte C. Madrian. 2006. "The Importance of Default Options for Retirement Saving Outcomes: Evidence from the United States." Working paper.
- Blake, David, and William Burrows. 2001. "Survivor Bonds: Helping to Hedge Mortality Risk." *Journal of Risk and Insurance* 68(2): 339-348.
- Blake, David, William Burrows, and J. Michael Orszag. 2002. "Survivor Bonds and Compulsory Annuitisation: Reducing the Costs of Pension Provision." In *Innovations in Retirement Financing*, ed. Olivia Mitchell, 222-233. Philadelphia: Pension Research Council.
- Blake, David, Andrew J. G. Cairns, and Kevin Dowd. 2006. "Living with Mortality: Mortality Bonds and Other Mortality-Linked Securities." *British Actuarial Journal* 12(1): 153-197.
- Braun, Michael, and Alexander Muermann. 2003. "The Impact of Regret on the Demand for Insurance." Unpublished.

- Brazell, David, Jason Brown, and Mark J. Warshawsky. 2007. "Combination of Life Annuities and Long-term Care Insurance: Tax Issues." Unpublished.
- Brown, Jeffrey R. 2001. "Private Pensions, Mortality Risk, and the Decision to Annuitize." *Journal of Public Economics* 82(1): 29–62.
- Brown, Jeffrey R. 2004. "The New Retirement Challenge." White paper for *Americans for Secure Retirement*. Available at [www.paycheckforlife.org](http://www.paycheckforlife.org).
- Brown, Jeffrey R. 2007. "Rational and Behavioral Perspectives on the Role of Annuities in Retirement Planning." NBER Working Paper 13537.
- Brown, Jeffrey R., and James M. Poterba. 2000. "Joint Life Annuities and the Demand for Annuities by Married Couples." *The Journal of Risk and Insurance* 67(4): 527–553.
- Brown, Jeffrey R., and James M. Poterba. 2006. "Household Demand for Variable Annuities." *Tax Policy and the Economy* 20: 163–191.
- Brown, Jeffrey R., Jeffrey R. Kling, Sendhil Mullainathan and Marian Wrobel. 2008. "Why Don't People Insure Late Life Consumption? A Framing Explanation of the Under-Annuitisation Puzzle." *American Economic Review*. May.
- Brown, Jeffrey R., Marcus Casey, and Olivia S. Mitchell. 2008. "Who Values the Social Security Annuity? Evidence from the Health and Retirement Study." NBER Working Paper 13800.
- Brown, Jeffrey R., Nellie Liang and Scott Weisbenner. 2007. "Individual account investment options and portfolio choice: Behavioral lessons from 401(k) plans." *Journal of Public Economics*. 91(10): 1992-2013.
- Brown, Jeffrey R., Olivia S. Mitchell, and James M. Poterba. 2001. "The Role of Real Annuities and Indexed Bonds in an Individual Accounts Retirement Programme." In *Risk Aspects of Investment-Based Social Security Reform*, ed. J. Campbell and M. Feldstein, 321–360. Chicago: University of Chicago Press.
- Brown, Jeffrey R., Olivia S. Mitchell, and James M. Poterba. 2002. "Mortality Risk, Inflation Risk, and Annuity Products," In *Innovations in Retirement Financing*, ed. O. Mitchell, Z. Bodie, B. Hammond, and S. Zeldes, 175–197. Philadelphia: University of Pennsylvania Press.
- Brown, Jeffrey R., and Peter Orszag. 2006. "The Political Economy of Government-Issued Survivor Bonds." *Journal of Risk and Insurance* 73(4): 611–631.
- Bütler, Monika and Frederica Teppa. 2007. "The Choice between an Annuity and a Lump Sum: Results from Swiss Pension Funds." *Journal of Public Economics*. 91(10): 1944-1966.
- Clark, Robert L., Madeleine B. d'Ambrosio, Ann A. McDermed and Kshama Sawant. 2006. "Retirement Plans and Saving Decisions: The Role of Information and Education." *Journal of Pension Economics and Finance*, 5(1)
- Clark, Robert L. and Sylvester Schieber. 1998. "Factors Affecting Participation Levels in 401(k) Plans," in *Living with Defined Contribution Plans* edited by Olivia S. Mitchell and Sylvester J. Schieber. Pension Research Council and the University of Pennsylvania Press.
- Cotis, Jean-Philippe. 2003. "Population ageing: Facing the challenge." The OECD Observer. September.

- Coile, Courtney, Peter Diamond, Jonathan Gruber, and Alain Jousten. 2002. "Delays in Claiming Social Security Benefits." *Journal of Public Economics* 84(3): 357–385.
- Congressional Research Service. 2005. "Pension Issues: Lump-Sum Distributions and Retirement Income Security." GRS Report for Congress.
- Davidoff, Thomas, Jeffrey R. Brown, and Peter A. Diamond. 2005. "Annuities and Individual Welfare." *American Economic Review* 95(5): 1573–1590.
- Drinkwater, Matthew. 2006. "Retirement Income Preferences." Windsor, CT: LIMRA International.
- Dushi, Irena, and Anthony Webb. 2004. "Household Annuitisation Decisions: Simulations and Empirical Analysis." *Journal of Pension Economics and Finance* 3(2): 109–143.
- Finkelstein, Amy, and James Poterba. 2002. "Selection Effects in the United Kingdom Individual Annuities Market." *The Economic Journal* 112(476): 28–50.
- Finkelstein, Amy, and James Poterba. 2004. "Adverse Selection in Insurance Markets: Policyholder Evidence from the U.K. Annuity Market." *Journal of Political Economy* 112(1): 183–208.
- Friedberg, Leora, and Anthony Webb. 2006. "Life is Cheap: Using Mortality Bonds to Hedge Aggregate Mortality Risk." CRR Working Paper 2005–12, Boston College Center for Retirement Research.
- Gan, Li, Michael Hurd, and Daniel McFadden. 2003. "Individual Subjective Survival Curves." NBER Working Paper 9480.
- Gentry, William, and Casey Rothschild. 2007. "Lifetime Annuities for US: Evaluating the Efficacy of Policy Interventions in Life Annuity Markets." Working paper prepared for the American Council for Capital Formation (available at [www.accf.org](http://www.accf.org)).
- Gustman, Alan L., Steinmeier, Thomas L. and Tabatabai, Nahid, "Imperfect Knowledge of Pension Plan Type" (September 2007). NBER Working Paper No. W13379
- Herschler, Jac. 2006. "The Surprising Path to Lifetime Income." *NAVA Outlook*. January.
- Hu, Wei-Yin, and Jason S. Scott. 2007. "Behavioral Obstacles to the Annuity Market." *Financial Analysts Journal* 63(6): 71–82.
- Holden, Karen, & Nicholson, Sarah. 1998. Selection of a joint-and-survivor pension (IRP Discussion Paper No. 1175-98). Madison: University of Wisconsin Institute for Research on Poverty.
- Hurd, Michael, Daniel McFadden and Angela Merrill. 1999. "Predictors of Mortality Among the Elderly." NBER Working Paper 7440.
- Hurd, Michael, and Kathleen McGarry. 1993. "Evaluation of Subjective Probability Distributions in the HRS." NBER Working Paper 4560.
- Inkmann, Joachim, Paula Lopes, and A. Michaelides. 2007. "How Deep is the Annuity Market Participation Puzzle?" Netspar Discussion Paper 2007-011.

- International Monetary Fund. 2007. "Mexico: Financial Sector Assessment Program Update—Technical Note—The Pension Annuity Market," IMF Country Report No. 07/163. May.  
<http://www.imf.org/external/pubs/ft/scr/2007/cr07163.pdf>
- Johnson, Richard W., Leonard E. Burman and Deborah I. Kobes,. 2004. "Annuitised Wealth at Older Ages: Evidence from the Health and Retirement Study." The Urban Institute. Final Report to the Employee Benefits Security Administration. U.S. Department of Labor. May.
- Knox, David M., "The Australian Annuity Market" (November 2000). World Bank Policy Research Working Paper No. 2495. Available at SSRN: <http://ssrn.com/abstract=632565>
- Koijen, Ralph S.J., Nijman, Theo E. and Werker, Bas J.M. 2007. "Optimal Annuity Risk Management." CentER Working Paper Series No. 2006-78. Available at SSRN: <http://ssrn.com/abstract=890730>
- Kotlikoff, Laurence J., and Avia Spivak. 1981. "The Family as an Incomplete Annuities Market." *Journal of Political Economy* 89(2): 372–391.
- Laibson, David. 1997. "Golden Eggs and Hyperbolic Discounting." *Quarterly Journal of Economics* 62: 443–477.
- Lindeman, David and Juan Yermo. 2002. "Private Annuity Markets." Paper presented at the OECD and INPRS Korea Conference on Private Pensions in Asia, Seoul, October 23 – 25. Available at <http://www.oecd.org/dataoecd/51/39/2763708.pdf>
- Lusardi, Annamaria. 2004. "Savings and the Effectiveness of Financial Education." In Olivia S. Mitchell, ed. Pension Design and Structure: New Lessons from Behavioral Finance.
- Lusardi, Annamaria, and Olivia S. Mitchell. 2007a. "Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education." *Business Economics*. January: 35-44.
- Lusardi, Annamaria, and Olivia S. Mitchell. 2007b. "Baby Boomer Retirement Security: The Roles of Planning, Financial Literacy, and Housing Wealth." *Journal of Monetary Economics* 54(1), 205–224.
- Mackenzie, George A. 2006. Annuity Markets and Pension Reform. Cambridge University Press.
- Madrian, Brigitte, and Dennis F. Shea. 2001. "Preaching to the Converted and Converting Those Taught: Financial Education in the Workplace." Working Paper, University of Chicago.
- Milevsky, Moshe Arye. 2005. "Real Longevity Insurance with a Deductible: Introduction to Advanced-Life Delayed Annuities." *North American Actuarial Journal* 9(4): 109–122.
- Milevsky, Moshe Arye, and Virginia R. Young. 2007. "Annuitisation and Asset Allocation." *Journal of Economic Dynamics and Control*. 31(9): 3138-3177
- Mitchell, Olivia S., James M. Poterba, Mark J. Warshawsky, and Jeffrey R. Brown. 1999. "New Evidence on the Money's Worth of Individual Annuities." *American Economic Review* 89(5): 1299–1318.

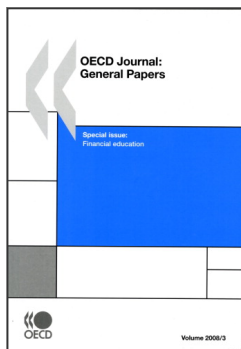
- Mottola, Gary R. and Stephen P. Utkus. 2007. "Lump Sum or Annuity? An Analysis of Choice in DB Pension Payouts." Vanguard Center for Retirement Research. Volume 30. November.
- Murtaugh, Christopher, Brenda Spillman, and Mark J. Warshawsky. 2001. "In Sickness and in Health: An Annuity Approach to Financing Long-Term Care and Retirement Income." *Journal of Risk and Insurance* 68(2): 225–254.
- National Association of Variable Annuities. 2006. *Annuity Fact Book*. 5<sup>th</sup> edition.
- OECD. 2006. "The Importance of Financial Education July 2006 policy Brief <http://www.oecd.org/dataoecd/8/32/37087833.pdf>
- OECD. 2007a. "Health at a Glance: OECD Indicators." p.22.
- OECD. 2007b. "Pensions at a Glance, 2007."
- Perun, Pamela. 2004. "Putting Annuities Back into Savings Plans." Working paper presented at the Society of Actuaries Symposium on Managing Retirement Assets, Las Vegas, April 1.
- Prudential Financial. 2006. "Learning the Two-Step: A New Approach to Asset Allocation for the Retiree." Prudential Financial white paper.
- Salisbury, Dallas. 2002. June 20 statement before the committee on Ways and Means, subcommittee on Oversight, United States House of Representatives. Hearing on retirement security and defined benefit pension plans.
- Scott, Jason S., John G. Watson, and Wei-Yin Hu. 2006. "Efficient Annuitisation with Delayed Payout Annuities." Working paper, Financial Engines Inc.
- Sheshinski, Eytan. 2008. *The Economic Theory of Annuities*. Princeton University Press.
- Sinclair, Sven H., and Kent A. Smetters. 2004. "Health Shocks and the Demand for Annuities." Congressional Budget Office Technical Paper Series 2004–09.
- Stewart, Fiona. 2007. "Policy Issues for Developing Annuities Markets." OECD Working Papers on Insurance and Private Pensions, No. 2. OECD Publishing.
- Tan, Christiana. 2006. "Evaluating Financial Education Programmes." PowerPoint presentation for "Improving Financial Literacy: International Conference hosted by the Russian G8 Presidency in Cooperation with the OECD, 30 November 2006, Moscow." Available at <http://www.oecd.org/dataoecd/28/52/37736902.pdf>
- Turra, Cassio M., and Olivia S. Mitchell. 2005. "The Impact of Health Status and Out-of-Pocket Medical Expenditures on Annuity Valuation." Research Brief (RB) 2005-079. University of Michigan, Retirement Research Center.
- Tversky, Amos, and Daniel Kahneman. 1974. "Judgment under Uncertainty: Heuristics and Biases." *Science* 185: 1124–1131.
- Warner, John T., and Saul Pleeter. 2001. "The Personal Discount Rate: Evidence from Military Downsizing Programs." *The American Economic Review* 91(1): 33-53.
- Warshawsky, Mark J. 2007. "Recent Developments in Life Annuity Markets and Products." Watson Wyatt working paper.



- Webb, Anthony, Guan Gong, and Wei Sun. 2007. "An Annuity People Might Actually Buy." Boston College Center for Retirement Research Issue Brief #7-10.
- Yaari, Menahem E. 1965. "Uncertain Lifetime, Life Insurance, and the Theory of the Consumer." *Review of Economic Studies* 32(2): 137-150.
- Yoo, Kwang-Yeol and Alain de Serres. 2004. "Tax Treatment of Private Pension Savings in OECD Countries and the Net Tax Cost Per Unite of Contribution to Tax-Favoured Schemes." OECD Economics Department Working Papers No. 406.

## Table of Contents

<b>Part I – Tools and Programmes on Financial Education</b>	7
Evaluating the Effectiveness of Financial Education Programmes <i>Alison O’Connell</i>	9
Financial Education Programmes in Schools <i>Shaun Mundy</i>	53
<b>Part II – Financial Education Issues</b>	129
<b>1. Pension</b>	
Pension Information: The Annual Statement at a Glance <i>Lena Larsson, Annika Sundén and Ole Settergren</i>	131
Financial Education and Annuities <i>Jeffrey R. Brown</i>	173
<b>2. Risk awareness and insurance</b>	
Stocktaking Report and Policy Recommendations on Risk Awareness and Education on Natural Catastrophes <i>Rebekah Green and Marla Petal</i>	217
<b>3. Credit</b>	
Credit: Some Macroeconomic, Market and Consumer Implications <i>Mario Fortin and Jacques Préfontaine</i>	307
The following document is available on line at <a href="http://dx.doi.org/10.1787/514545567321">http://dx.doi.org/10.1787/514545567321</a> <b>Taking Financial Literacy to the Next Level: Important Challenges and Promising Solutions</b> <b>Proceedings of the OECD-US Treasury International Conference on Financial Education,</b> <b>7-8 May 2008, Washington, D.C.</b>	



**From:**  
**OECD Journal: General Papers**

**Access the journal at:**  
<https://doi.org/10.1787/1995283x>

**Please cite this article as:**

Brown, Jeffrey R. (2009), "Financial Education and Annuities", *OECD Journal: General Papers*, Vol. 2008/3.

DOI: [https://doi.org/10.1787/gen\\_papers-v2008-art20-en](https://doi.org/10.1787/gen_papers-v2008-art20-en)

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to [rights@oecd.org](mailto:rights@oecd.org). Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at [info@copyright.com](mailto:info@copyright.com) or the Centre français d'exploitation du droit de copie (CFC) at [contact@cfcopies.com](mailto:contact@cfcopies.com).