

Addressing Longevity Risk through Private Annuities: Issues and Options*

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Abstract

This paper explores why both demand for and supply of private sector life annuities are low across much of the world and what government should and could do about a set of identified or conjectured market failures. As regards the demand side, we are not any closer to a solution of the “annuity puzzle” raised some 25 years that the maintained stark welfare benefits of an annuity under uncertainty of end-of-life are not matched by consumer demand. There is still conceptual and empirical uncertainty about the main classical deterrents, i.e. the role of public annuities, family and bequest. What was added over the last 10 years are many new arguments about the role of behavioral limitations to explain a sizable part of the puzzle, and more recently the role of financial knowledge and more broadly financial capability in the low demand for life annuities. As regards the supply side, the view on key restrictions has also not changed in recent decades: regulations, investment risk, and longevity risk; actually more recent developments have made them even more relevant. This has re-raised suggestions to share investment and longevity risk with the annuitant, and to use more deferred annuities. Yet shedding too much of the guarantees makes life annuities perhaps cheaper but also less attractive compared to promoted alternatives. In view of the many deficiencies on the demand and supply side of annuities, there seems ample of role for government to get involved as regulator, market creator and facilitator, information creator and mediator, etc. But the role of government in private sector annuities may be conjectured to go well beyond that: Without a political will and commitment toward private sector life annuities the demand and supply may simply be not there.

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I. Introduction

I.1 Motivation

This paper explores why both demand for and supply of private sector life annuities are low across most of the world and what government should and could do about a set of identified or conjectured market failures. To motivate the topic and the conjectured demand and supply deficiencies, and thus the need for government interventions beyond public life annuity supply, we start with three observations: policy developments in recent decades should actually significantly help “push” private life annuities; autonomous demand is consistently low across most countries; and insurance companies seem to have little interest in annuity products and many seem interested in getting out of the traditional market.

Life annuities are understood to be the unconditional commitment by a financial sector institution/insurance company to guarantee a periodic payment from a certain age onward until the death of the insured in exchange for an upfront down payment (purchase price). There are at least five reasons why policy developments or changes in countries’ enabling environments should have increased the individual demand for as well as the provision of life annuities by the private sector (in many countries, more than one rationale may apply):

- (1) The systemic reforms of public pension schemes that were inspired by the Chilean reform revolution of 1981 and moved from unfunded (collective) defined benefit (NDB) schemes towards Individualized funded and defined contribution (FDC) schemes. By 2008, such reforms had reached 31 countries, with a few changes since (e.g., suspension, elimination, reduction, and introduction; see Holzmann 2013a). This reform revolt requires new payout modes and the replacement of public annuities with other disbursement mechanisms, in particular the private sector equivalent of a public life annuity.
- (2) The decreasing public generosity with public annuities that are the result of fiscally driven public pension reforms across the globe and the encouragement by governments for voluntary supplementary saving to cover the old-age income gap (Hinz *et al.* 2013). The latter is expected to increase as the result of projected further increases in longevity, giving rise to the call of “retire later and save more” (OECD 2013a). Some of this additional individual and voluntary old-age saving is expected to translate into demand for life annuities.
- (3) While the (partial) change from NDB to FDC schemes for public pensions reached 31 countries by 2008, the move from funded defined benefit (FDB) schemes toward FDC schemes is almost complete across the corporate world and across countries, at least for new entrants (OECD 2013b). But in many cases, also existing FDB plans have been replaced by FDC plans, with the employer typically only involved with contributions and management in the accumulation phase, while disbursements are often left to individual decisions. Again, some of these accumulated savings at retirement should lead to demand for life annuities.
- (4) In countries with main basic provisions for the elderly financed from general government sources (as in Australia and New Zealand), there is an interest not only to supplement this government provision with private retirement savings but also to have it disbursed as a life annuity (rather than being largely invested in oversized and tax-sponsored private housing). This should help reduce the public retirement bill in the face of projected population aging.

(5) Last but not least, population aging has reached the mostly younger societies in South Asia (particularly East Asia), where there has traditionally been more openness to funded provisions, often in the form of central provident funds that historically offered no life annuities. Traditional family support in these societies is withering given falling fertility rates, urbanization, and migration (e.g., Park 2011). While supplementary voluntary saving and public encouragement to do so are on the radar screen of many countries, the need for life annuities has not yet reached individuals and governments for the most part (see Holzmann 2014 for the Malaysian case).

In most countries of the world, the existing and additional new potential demand for life annuities has not yet translated into actual demand, and demand is typically diverted away from traditional annuities when alternative payout options are freely available. Yet there are a few notable exceptions in the degree of annuitization across countries:

- In the U.S., only about 1% of retirees with 401(k) plans (tax-privileged corporate schemes) purchase an annuity (LIMRA 2013). The annual sums spent are quite small compared with the available resources at retirement; they amount in 2012 to US\$7.7 billion for immediate life annuities and US\$45 billion for equity-indexed annuities (otherwise, 75% are bought with guaranteed life annuities).
- The situation in Australia is worse. Reportedly, only a few hundred life annuities per year are bought in a market of a few million retirees (Plan for Life 2012); this amounts to less than 1/100th of a percent of the annual flows.
- The situation is only somewhat better in Sweden (where the changes since the 1994 reform may not yet be fully effective). All occupational groups except white collar workers are more likely to choose a 5-year withdrawal rather than a life annuity, in particular women and those with less education (Palmer and Larsson 2010).
- The situation is radically different in Switzerland, where around 80% of the accumulated balances are being transformed into a traditional life annuity (Bütler and Teppa 2007; Rocha, Vittas, and Rudolph 2011). This may be due to historical and regulatory reasons and the role and position of government. While the form of disbursement seems little contested, the level of unconditional commitment by the sponsor is seemingly coming under attack, as shown by the discussion about “flexible annuities” and the sharing of longevity risks (Ottawa 2014).
- In Latin America, the outlier is Chile, the originator of the FDC public pension reform revolution. While individuals are free to choose between some phased withdrawals and full life annuitization, about 70% of retirees choose the latter (Rocha, Vittas, and Rudolph 2011). The development of a competitive, efficient, and transparent annuity market within a few decades was conducive to this result.
- In the other parts of the world – Sub-Saharan Africa, the Middle East and North Africa, and Asia (except, perhaps Japan) – life annuities play a very marginal role if offered at all (Mitchell, Piggott, and Takayama 2011).

The limited market outcomes for life annuities may reflect limited demand but may also be the result of limited and decreasing interest by insurance companies to supply such products. There are global indications of limited interest and of existing suppliers’ desire to exit the market altogether (SOA 2013, Session 44; Ernst & Young 2013). There may be good reasons to exit, as life annuities provided by the financial sector are challenged by a number of developments, including:

- There is high uncertainty regarding aggregate longevity developments and their distribution across socioeconomic groups.

- The current low (real) interest rate environment for public bonds and uncertainty about how long this will last before inflation sets in make the price of life annuities unattractive while increasing the risks for providers.
- The lower levels of financial market rate of returns risk being linked with higher volatility in the real levels (the “new normal?”).
- There is strong, persistent regulatory uncertainty regarding annuity providers’ own business as well as the available hedging products and long-term taxation of returns.
- Unless risks are increasingly shared between provider and annuitant, the costs of reserving for insurance companies will increase strongly as Solvency II rules in the European Union (EU) are implemented.
- The most recent financial crisis elevated counterpart/credit risk and investment risk that have not yet abated.
- Traditional life annuities are increasingly difficult to supply, so new annuity-near products have been proposed in developed markets. However, they are still untested in the long run and early results are often not convincing.

I.2 Structure of the paper

Against this background, the key angle of the paper is threefold:

- (1) To review the key demand and supply side constraints for life annuities; to provide an assessment of their relative importance; and to offer first ideas of policy interventions.
- (2) To outline the role of government from a public policy perspective to improve life annuity markets if welfare analysis supports such a move.
- (3) To offer the perspective of an economist who has some knowledge of financial markets but is not a financial economist; has substantial international experience in pensions across all pillars; and is finalizing a think-piece for a large central provident fund in Asia that includes the future role and form of annuities.

To this end, the structure of the paper is straightforward: Sections II and III review the demand and supply constraints, respectively. Section IV explores the role of government in enhanced annuitization across developed and emerging economies, while Section V concludes.

II. Demand Constraints to Provision of Life Annuities

This section explores demand side arguments for why the level of annuitization by individuals is often much smaller than economic theory would suggest.

II.1 Basic Economic Arguments for Life Annuities

According to economic considerations, annuities can substantially increase individual welfare by eliminating the income risk associated with the uncertainty of the timing of one’s death, thus providing an individual with a higher level of lifetime consumption than he would otherwise enjoy. The classical reference is Yaari (1964, 1965), who showed that in the absence of a bequest motive, risk-averse individuals would find it optimal to annuitize 100% of their wealth at retirement.¹ Later papers investigated the effect of relaxing many of the

¹ In a speech in 2010, Yaari mentioned that his 1965 paper was originally intended to help resolve inconsistencies in neoclassical economics and the apparent low spend-down rate of assets around

restrictive assumptions (e.g., Bernheim 1987, and in particular Davidoff, Brown, and Diamond 2005²). Davidoff, Brown, and Diamond (2005) examine the demand for life annuities with market incompleteness and find some annuitization remains optimal over a wide range of preference parameters but complete annuitization does not. For annuitization to remain optimal, utility need not satisfy the Von Neumann-Morgenstern axioms nor does the utility function need to be additively separable. Furthermore, annuities need not be actuarially fair; they must only offer positive net premiums (i.e., mortality credits) over conventional assets' returns.

These theoretical considerations seem to be borne out by simulations that make typical and less typical assumptions about the utility function (i.e., use of separable utility and others), market completeness, etc. Estimations with a “bare bones” model suggest that annuitization and thus full insurance against the uncertainty of death can always achieve welfare gains well above 50% (Davidoff, Brown and Diamond 2005). A more realistic model that includes a portfolio choice with stochastic health depreciation, a bequest motive equal to two years of consumption, and pre-existing annuitization through U.S. Social Security and (corporate) defined benefits plans finds that having access to a private annuity market can still deliver non-negligible welfare gains (Yogo 2014). For a household with a healthy 65-year-old household head, this annuity access is worth about 16% of the household's financial wealth.

Despite these strong theoretical and quantitative indications on the value of annuitization of wealth at the end of the lifecycle, the empirical evidence on the importance of and demand for private sector annuities in countries across the world remains very limited. The selected examples in Section I are corroborated by various (now dated) reports and international overviews (see James and Song 2001; James and Vittas 2001).

This contradiction between theoretical predictions of the main welfare gains through annuitization for individuals under a large set of assumptions and the reality of narrow annuity markets in most countries has given rise to the well-known “annuity puzzle.” To solve or at least shed light on the puzzle, the initial approach was to rationalize the low demand within neoclassical theory. The next step was and still is to explain the low demand with behavioral limitation, an approach gaining prominence with the burgeoning literature on behavioral economics. We follow this approach but with selective examples plus a few own thoughts considered relevant. In addition, we add one more element that has found limited attention so far: the role of individuals' lack of financial information and capabilities, an ingredient of the puzzle that is consistent with both the fully rational and the behavioral approach, and the impact this may have on annuity demand.

II.2 Main rationales for low demand for life annuities

Many arguments have been raised to explain the low level of annuitization by individuals in rich and less rich countries (see, e.g., Benítez-Silva 2003; Benartzi *et al.* 2011; Milevsky 2013). Milevsky traces the formal labeling of the annuity puzzle back to Huebner (1927) but states that most economists would link it with Modigliani (1986) and his Nobel acceptance speech. For Modigliani, the “subsequent 25 years of scholarly literature have (1) attempted to

retirement. In that sense, his paper was intended as “positive” (to explain observed behavior) as opposed to “normative” (to provide financial advice); see Milevsky 2013: 73.

² The latter paper is a fundamental extension and generalization of the classic Yaari 1965 paper, that is reportedly the most widely quoted paper in the annuity area.

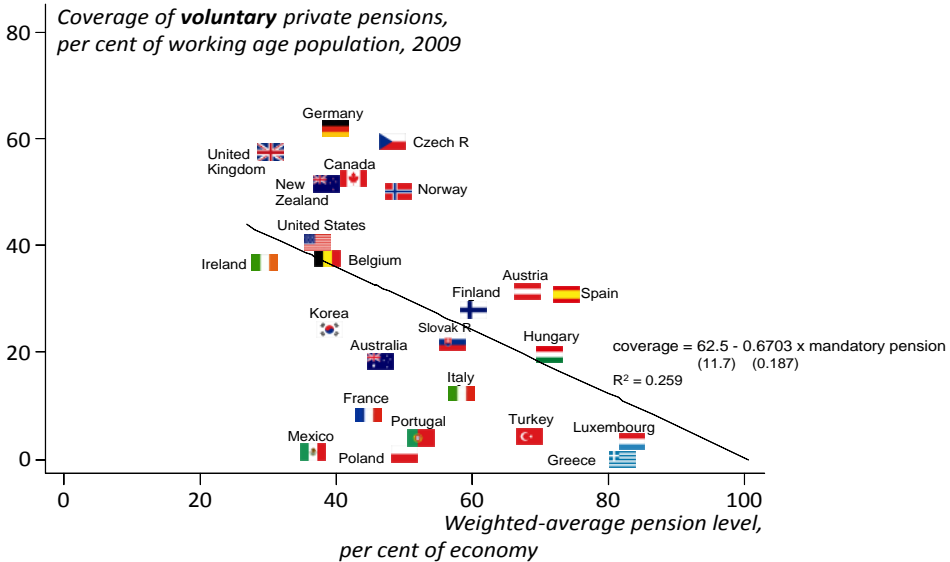
solve the puzzle, (2) made the puzzle even worse, or (3) claimed that the puzzle does not exist.”

The following selection is not considered representative of even the key papers written, but reflects my sense of relevance of the arguments while adding a few ideas and observations of my own. The first three rationales presented are around the alternatives to private annuities: public annuities, family as annuity, and bequests. The next set of arguments highlights market imperfections and the consequences for annuity choices.

The existence of annuity alternatives

Early on, the argument was raised that the existence of alternatives to market annuities is a clear deterrent for their demand and purchase (see Benítez-Silva 2003 for references and own modeling). And in advanced economies and increasingly in emerging economies, there are many alternatives. Most importantly, the existence of publicly provided retirement benefits in the form of earnings-related social insurance pensions (as they exist in the majority of countries but not always for the majority of the population) or basic pension benefits (of universal or means-tested type). Clearly, the more comprehensive and generous these are, the smaller the need to pre-save voluntarily and then to purchase private annuities. In turn, a reduction in generosity of public provisions should be reflected in higher voluntary pre-saving and annuitization. While there is some evidence from cross-country data on the saving part of this inverse relationship (Figure 1), evidence regarding annuitization from cross-country data is not yet available, and not apparent in country panel data.

Figure 1: Coverage Rate under Voluntary Private Pension Schemes versus Replacement Rate under Public Pension Schemes



Source: Whitehouse 2013.

But not every reduction in public annuities’ generosity will translate into higher private annuity demand. This may be the case if the public annuity was too generous compared to individual preferences and needs, in particular for higher income groups. Such public over-annuitization has and may still exist in a number of European and other countries. But how high the replacement rate (as percent of last or average income), and thus the optimal public annuitization, should be is still undecided. A recent analysis of lifecycle expenditure (Aguiar

and Hurst 2013) suggests that a reduction of expenditure toward retirement and beyond does not reflect a reduction in non-durable consumption, but lower inputs (expenses) into market-based work or are amenable to home production. Their quantitative model documents that the disaggregated lifecycle consumption profile model implies a level of uninsurable permanent income risks that is substantially lower than that implied by a model using a composite consumption good. This is consistent with the hypothesis of an overestimation of income replacement and annuitization needs with traditional models and an observed lack of crowding-out and -in of annuity products.

Similar crowding in and crowding out of annuities should also be observed between defined benefits (DB) offered by cooperative plans and private annuities. Across the world, DB schemes have been largely replaced by DC schemes, so more demand for private annuities should have emerged, but this is typically not the case. This may be due to behavioral limitations or supply imperfections, discussed below, but may also reflect that corporate pensions across the world are primarily a main tax-smoothing savings vehicle, so that a change in the payout should have limited effects on annuitization.

Last but not least, the provision of basic retirement income in the form of social pensions or similar benefits for the most vulnerable elderly has been the notable development over the last two decades (Holzmann, Robalino, and Takayama 2009). Between 1990 and 2011, the number of countries with a zero pillar increased from 30 to 67 (Holzmann 2013a). There is increasing evidence that such provisions and their generosity crowd out the demand for social security annuities in countries with an already high level of informality (Levy 2008; Ribe, Robalino, and Walker 2012). In those countries, the annuity market was already narrow or nonexistent, so no crowding out could take place.

Family as a risk-sharing unit

There are strong priors that the family is a risk-pooling unit, including for managing old-age income support and the uncertainty of death. Kotlikoff and Spivak (1981) were one of the first to explore risk-sharing in families as an alternative to annuities. They wrote:

“Consumption and bequest-sharing arrangements within marriage and larger families can substitute to a large extent for complete and fair annuity markets. In the absence of such public markets, individuals have strong economic incentives to establish relationships which provide risk-mitigating opportunities. Within marriages and families there is a degree of trust, information, and love which aids in the enforcement of risk-sharing agreements. Our calculations indicate that pooling the risk of death can be an important economic incentive for family formation; the paper also suggests that the current instability in family arrangements may, to some extent, reflect recent growth in pension and social security public annuities.”

Even in modern societies, the family is the primary institution for managing social risks and the importance of risk management increases the lower the supply of public and market-based instruments (Holzmann and Joergensen 2001). But even as the supply of the latter increases, participants in family-based programs cannot easily switch from informal to formal (public and market-based) arrangements, as the older generation has expectations of the younger generation that need to be honored. As in the move from unfunded to funded pension arrangements, a sudden switch can only happen if a reneging or double payment takes place (Holzmann, Packard, and Cuesta 2001). This may help explain why informality and non-participation in social insurance schemes remains a deep-rooted problem in

emerging economies, but also why the demand for annuities remains low even when they are available.

Bequest motives

The motive to leave bequests or legacies is considered one of the main arguments why 100% annuitization of wealth will not take place; the motive was excluded explicitly by Yaari (1965) in his model. But even now it is not well established how much of a bequest is actually targeted or is simply the unintended result of death. Further, there is no shared view regarding the degree to which bequests are responsible for low annuity demand. Some claim that “There is no evidence that bequest motives are an important factor in making marginal annuity decisions” (Brown 2001: 29). Others claim that the “... results suggest that the bequest motive is the strongest single deterrent to annuity purchase, followed by social security” (Purcal and Piggott 2008: 513).

My own take is that bequests substitute for annuitization but as part of a larger family arrangement. Without the expectation of bequests, the elderly might not receive the same personal attention from the younger generation (including visits and services), while committed bequests, such as for housing and property, enable the elderly to garner informal transfers that may become akin to an annuity. Such intergenerational arrangements are still widespread in emerging countries and may be a reason for the low participation in public annuity schemes and for the essential lack of annuitization of accumulated financial savings.

The incompleteness of financial markets and the existence of many risks

If financial markets are incomplete, then low or no annuitization may be a rational decision for individuals. Such incomplete markets may be the result of incomplete annuity or security markets, and have been analyzed by Davidoff, Brown, and Diamond (2005). The (il)liquidity of the financial product plays a critical role. If the available annuity provides consumption later than the individual wants, then the assumed illiquidity of the annuity limits its attraction. The liquidity demand of uncertain health expenditure may render annuities less attractive if these health care risks cannot be insured (Turra and Mitchell 2008). And low annuity returns (i.e., only somewhat better than alternative financial assets) combined with within couple-risk-sharing and high levels of pre-existing annuities can render fixed annuities unattractive at any age (Dushi and Webb 2004).

The relevance of the incompleteness of financial markets can be extended and expanded to the typical situation of emerging economies where individuals are exposed to many more natural and other risks but have even less access to formal risk management instruments from the government and the financial sector (Holzmann and Joergensen 2001). In such a situation, an informal risk-sharing mechanism prevails and available financial resources are pooled across individuals, risks, and time in collective self-insurance. In such a situation, the singling out of the risk of uncertainty of death and the purchase of an annuity are unlikely to be optimal.

II.2 Behavioral limitations

Section II.1 motivated why in many cases low or no annuitization may be the outcome of fully informed rational decisions by individuals. However, such explanations are not able to explain the full scope of low or no annuitization. Furthermore, the growing literature and instructive examples from behavioral finance signal key behavioral limitations by individuals in the area of financial decisions concerning the future and intertemporal exchanges. The problems of planning and following through are well documented for the accumulation phase

of retirement saving (see Benartzi and Thaler 2007 for an overview). This could be even more relevant for the decumulation phase and any annuitization decision, as this may be the biggest and most irreversible financial decision in an individual's life. As a result, to the many rational explanations of the annuity puzzle, behavioral explanations have been added during the last decade or so. Again, this subsection does not aim to offer a full overview or even a representative selection. We outline here the conjectured key leads that lend themselves to policy interventions.

There are many behavioral particularities with regard to the observed annuity decisions, such as the preference for a guaranteed (n period certain) life annuity over self-annuitization for n periods plus deferred annuity, albeit both are essentially equivalent but the latter is typically cheaper (Hu and Scott 2007). But this example explains only why certain types of annuity are preferred over others, not why annuity demand is low or what can be done about it.

The key behavioral lessons with regard to savings decision and annuitization can be put under the heading "the decision environment matters," and cover: the importance of framing annuitization; the need to reduce complexity and simplify the decision environment; and the role of default options and the need to overcome annuity-related mental accounting and loss aversion. Each of these is dealt briefly with in turn.

The framing of annuitization

There are strong conceptual and empirical indications that it matters whether one frames an annuity purchase decision in a consumption frame or in an investment frame (Brown 2007, Brown *et al.* 2008). As annuities have typically been framed in the less convincing investment world, this may explain some of the low demand.

Any intertemporal financial decision has two components: how to invest and what to do with the result (i.e., consume). The consumption frame focuses on the second component while ignoring the investment part. In contrast, the investment frame focuses only on the first component, ignoring the consumption part.

The consumption frame stresses the welfare effects of the enhanced consumption that a life annuity allows one to achieve. Due to the pooling of resources among annuitants, those surviving benefit from the mortality premium (i.e., the resources of those deceased during a given period). This can be easily presented for the simple 2-period case where the individual dies with a probability q in period 2 (Brown *et al.* 2008: 305). If in the first period the individual invests his wealth W in a bond with a return R , he can consume $W(1+R)$ in the second period. However, if he buys an actuarially fair annuity, he is able to consume $W(1+R)/(1-q)$ if he survives. If the survival probability $(1-q)$ is 0.5, he can double his consumption in the second period with additional income generated by the mortality premium $1/(1-q)$, and this is financed by those who do not survive the second period.

The investment frame focuses on the intermediate results of the return and risk features when choosing assets while ignoring the consequences for consumption. With the investment focus, the individual will consider the rate of return and the variance of payouts. In the case of the bond selection, the return is R and poses no risk since it pays the same irrespective of state. In the case of the annuity selection, the return is $(1+R)/(1-q)$ with a probability $(1-q)$, and 0 with a probability q . The expected return is also R . Yet despite having the same return as the bond, the annuity's return appears riskier.

This reversal is the key to the framing hypothesis: under the consumption frame, the annuity is attractive because it serves as a form of insurance; under the investment frame, the annuity is viewed as riskier than a bond because its return depends on a random variable q .

Brown *et al.* (2008) tested the framing hypothesis and found results in line with the model above. In the consumption frame, 72% of respondents chose the annuity over the consumption stream from a savings account of similar actuarial value. In the investment frame, that proportion reversed. Specifically, only 21% preferred a life annuity over the savings account alternative. Similar reversals emerged for other tested alternatives, such as different term annuities.

These consumption frame arguments can be enhanced by stressing how life annuities can simplify retirement planning. Annuities serve to increase the consumption level in retirement but can also deal with the uncertainty of rate of return and life-expectancy developments, and help solve the cognitively difficult task of deciding how fast to draw down wealth and when to start retirement (Benartzi, Previtro, and Thaler 2011: 149).

Complexity reduction and decision simplification

The experience with financial decisions in the accumulation phase of retirement savings suggests that complexity reduction in product presentation and choices but also decision simplification through spoon feeding and appropriate default options are critical for nudging savings decisions. These messages have not yet fully reached the world of annuities, albeit they may be productively applied.

Annuities can be presented as a complex product, with many options within and across providers that cannot be easily compared. Faced with such a complex decision situation, individuals are likely to postpone decisions and ultimately never make them. Against this background, a more limited number of options that include “plain vanilla” products will help to reduce complexity. The experience from Chile suggests that direct online comparability of different providers and products for key features (immediate, deferred), individual characteristics (age, sex), and market conditions (interest rate) reduces complexity and simplifies decisions. That all fixed annuities are real (i.e., fully price-indexed) helps enormously, of course (Rocha, Vittas, and Rudolph 2011).

The role of default options, mental accounting, and loss aversion

The role of a default option is well known for the accumulation phase but it seemingly also applies for the decumulation phase, including the conversion of cash into an income stream. If DB plans offer a lump-sum option but the default is conversion into an annuity, then the annuitization rate is typically 60% and more (Benartzi, Previtro and Thaler 2011: 151). When in the US DC plans are offered, in only 21% of cases do such plans offer annuity options, and only 6% of plan members chose this option when available (Schaus 2005). This indicates that the option alone is not sufficient but needs to be steered via defaults or other nudges, and that there may be other mental obstacles that need to be overcome, such as mental accounting and loss aversion when converting a DC balance into an annuity. The latter may be crucial why a decision for annuitization is not taken: The mental costs of putting a large pot of money on the table exceed the prospect of any future benefits. Making automatic decumulation features available in DC plans may sound like a great idea, but is likely to hit regulatory obstacles and employers’ fiduciary concerns.

II.3 Informational limitations from industry and by individuals

Both rational decisions and behavioral nudges to annuitize wealth require individuals to have information about the life annuity product and, quite likely, broader financial knowledge or even relevant financial capability. These potential requirements are present in the context of: a complex product even if simply presented; no established knowledge about what information the annuity provider should offer; low reported levels of financial literacy (knowledge) and capability (including skills, attitude, and behavior) for planning decisions and implementation; and only emerging evidence that this all matters for increased and more effective annuitization. These issues are discussed in turn.

To purchase an annuity, a beneficiary should broadly understand the key risk characteristics of the main annuity types but also those of the other alternatives retirement products, such as phased withdrawals and self-annuitization. Table 1 summarizes these key characteristics as well as the decision-relevant provisions of bequest and liquidity. While comprehensive, the table omits other elements that need further discussion, such as the combination of products (e.g., lump-sum and deferred annuities), the pricing implications of the different characteristics, and the possible differentiated tax treatment of alternative products.

Table 1: Risk Characteristics of Retirement Products for Pensioners

	Protection Against			Provision of	
	Longevity Risk	Investment Risk	Inflation Risk	Bequest	Liquidity
Fixed Real Life Annuities	Yes	Yes	Yes	Limited	No
Fixed Nominal Life Annuities	Yes	Yes	No	Limited	No
Escalating Real Life Annuities	Yes	Yes	Yes Plus	Limited	No
Escalating nominal Life Annuities	Yes	Yes	Partial	Limited	No
Variable Life Annuities: Guaranteed Benefits	Yes	Yes	Possible	Limited	No
Variable Life Annuities: Bonus Payments	Shared	Shared	Shared	Limited	No
Variable Life Annuities: Unit-Linked	Shared	No	No	Limited	No
Deferred XY Life Annuities	Yes	Partial	Depends	Partial	Partial
Period-certain XY Life Annuities	Yes	Depends	Depends	Partial	No
Lifetime Phased Withdrawals	No	No	Possible	Yes	No
Term Annuities	No	Possible	Possible	Yes	No
Lump Sums	No	Possible	Possible	Yes	Yes
Self-Annuitization	No	Possible	Possible	Yes	Yes

Notes: Annuitization risk is present in all fixed and escalating annuities but does not affect variable annuities.
 Bankruptcy affects all types of retirement products but is particularly important in life annuities.
 Source: Based on Rocha, Vittas and Rudolph 2011, with author' additons.

It is still not yet well established what kind, in what detail, or with what means (brochure, DVD, one-to-one instruction) information should be offered by product providers or neutral advisors to best inform potential consumers. What is broadly established nowadays is that in financial education, the timing of information (the “teachable moment”) together with content and the means of communication matter for productive absorption.

The special challenge for enhancing financial knowledge about annuity purchases is that this is a unique and quite likely once-in-a-lifetime event, with limited predecessors. This reduces individuals’ incentives to spend time on information gathering, albeit much is at stake. A

similar situation exists with mortgages (which are, to some degree, the reverse of a term annuity). After the recent mortgage crisis in the U.S., a number of states made some financial literacy instructions mandatory for mortgage applicants. Mandating such instruction for retirement disbursement decisions should, however, apply to all types of retirement products, not just annuities, so that a selective disadvantage does not emerge.

The need for some financial education about annuities emerges from the limited empirical evidence that individuals with low measured financial education seem to be particularly confused by annuities (Brown, Kapteyn, and Mitchell 2013). But it may not be possible to teach effectively about annuities and the trade-offs with alternative retirement products to individuals who have little understanding of financial issues, including financial products.

Indications for the importance and interdependence of specific product knowledge and individual engagement in the decumulation decision emerge from a discrete choice experiment with 854 respondents approaching retirement (Bateman *et al.* 2013a). The experiment studied whether individuals make choices consistent with expected utility maximization in allocating wealth between life annuities and phased withdrawals at retirement. The analysis found overall rates of inconsistency with the standard CRRA (constant relative risk aversion) utility model of roughly 50%, and variations in the inconsistency rates that depend on respondents' characteristics. Individuals with poor numeracy skills and low "engagement" with the choice task (as measured by scores on a task-specific recall quiz) are more likely to make allocations to the phased withdrawal. Individuals with higher financial capability and better knowledge of retirement income products are also more likely to score high on the engagement measure, yet capability and knowledge do not have independent effects on the consistent choice rates.³

III. Supply Constraints to Provision of Life Annuities

This section explores the supply side of private sector-provided life annuities to understand whether supply is the binding constraint for the observed narrow annuity market in much of the world. The question about the limited market for annuities is rarely asked and may elicit different answers within and across countries.⁴ For example, the U.K. Pension Commission (2005: 190ff) suggests that projected annuity demand risks being constrained by supply capacity. The answer may be different in low demand countries such as Australia and the U.S., and perhaps even in high demand countries such as Chile and Switzerland. And the answer 10 years ago may be different than that given now.

Understanding supply constraints in a global overview is difficult, as supply issues regarding annuities have been little explored historically. Supply issues are rarely mentioned in the U.S.-dominated discussion about the annuity puzzle, perhaps because the supply side is better investigated in the U.S. and its financial markets are perceived as well developed.

³ To explore further this knowledge interdependence regarding annuities as well as further demand and supply issues, a project proposal by Bateman *et al.* (2013b) on "Retirement income solution: Demand meets supply" was submitted jointly with Metlife to the Australian Centre of Excellence. Key objectives of this project are to: (a) identify which features of income stream products are understood and/or can be explained and to whom; (b) quantify features that are valued, how much they are valued, and why; (c) carefully price these features under plausible financial scenarios; and (d) compare relative valuations from consumers and costs from providers to define a feasible market.

⁴ For an exploration into the supply side issues, see, for example, Impavido, Thornburn, and Wadsworth 2004; Stewart 2007; Antolin 2008; and Rusconi 2008.

Supply analysis is less deep in other countries and regions because there is less to analyze (see Fornero and Luciano 2004 and Mitchell, Piggott, and Takayama 2011 for cross-country explorations in Europe and worldwide, respectively). Over the recent decade, there was a little more interest in annuity market research as systemic pension reform countries moved from the accumulation phase to the decumulation phase in Latin America and Central and Eastern Europe (Rocha, Vittas, and Rudolph 2011). And the analyses mentioned above suggest major data and information constraints that may also explain the limited analytical supply.

This section does not attempt to cover this gap. It explores with simple economic means possible supply constraints and their likely underlying determinants, and infers what might be done about them. This analysis is done against the background of the business model behind the annuity market (see Box 1) and the four key challenges for annuity providers: (i) handling the burdensome and further tightening regulation of annuity providers; (ii) managing the investment risk; (iii) addressing the aggregate longevity risk, and (iv) what are close product substitutes. Any of these issues can limit annuity supply, and alternative products may provide close substitutes. We deal with each issue next.

Box 1: The Basic Life Annuity Business Model

The basic life annuity model consists of the exchange of a lump-sum payment by the annuitant for a series of future payments until his or her death. In its simplest version, the periodic payments (annuities) are immediate and constant in nominal terms.

To minimize the (idiosyncratic) longevity risk, the annuity provider has an interest in the largest possible risk pool; i.e., the largest number of annuitants. This makes the industry oligopolistic by nature.

To immunize the portfolio of liabilities against the rate of return/interest rate risk, the provider does best by matching the profile of liability and assets; i.e., the provider uses bond-backed products (government bonds, corporate bonds, and mortgages) as an input to produce annuities as an output.

The value added by annuity providers is the conversion of these bonds into mortality-contingent income streams.

III.1 The regulatory burden of annuity providers

There are many reasons why financial markets – their products and providers – should be tightly regulated; the recent financial crisis has enhanced the attention across all market segments. Standard welfare economics suggests a variety of reasons why industries should be tightly regulated: abuse of market power; market externalities; asymmetric information; and not fully rational individuals. For financial markets and in particular the life annuity market, all of these reasons apply (Davis 2004). In addition, the complexity of the product(s), the number of variables that determine the outcome, and the length of contract all require special care.

Insurers need a sufficiently large risk pool to reduce their risk and, under the typical regulations existing in most countries, the costs of provisioning against this risk. The risks

faced by an annuity provider depend directly on the number of annuities written (see Cannon and Tonks 2008): with a well-known survival probability in any given period for a cohort of annuitants s , assuming n annuities of equal size are sold, the expected payout in that period is $n \times s$, and the standard deviation of the payout is the square root of $[ns(1 - s)]$. Hence the relative risk declines with the number of annuities sold and for sufficiently large numbers, this risk becomes negligible. This implies that the annuity industry is by nature oligopolistic and requires government attention and regulation. The life annuity market is typically highly concentrated; i.e., a few companies have a large share of premiums and a somewhat smaller share in payouts. This difference signals the consequence of providers leaving the active market.

A major part of public regulation and burden for the annuity provider reflects government concern that an annuity provider will become insolvent. Without regulation, this risk can be realized quickly as incipient insurance providers have an incentive to price cheaply to get into an oligopolistic market and grow, and the moment when insolvency risks turning into illiquidity is still many decades away. In face of basic regulations against such behavior, the main avenue for insolvency of annuity providers is under-provisioning against risks taken because the risk was unintentionally or purposely underestimated. A well-known example of under-provisioning is the fate of Equitable Life in the U.K. (Cannon and Tonks 2008): this insurance company offered guaranteed annuities to individuals who saved through Equitable Life personal pensions. However, the company seemingly neither charged for this guarantee nor set aside any reserves to cover their (expected) costs. Other companies that offer such guarantees undertook prudential management through reserving, capping, and reinsurance. Equitable Life believed it could manage these liabilities through discriminatory bonuses on the with-profits personal pensions between policy holders with and without this guarantee. When this discrimination was ruled illegal, the fund became insolvent; it was closed to new members in 2008.

This example shows the importance of prudential regulation and more recently, the insistence of regulators on appropriate risk modeling and increased provisioning by providers. The provisioning requirements in Europe were recently strengthened by new Solvency II rules of addressing the longevity risk in the supply of annuities (Boerger 2009). And the eventual capital requirements of annuity supply are reportedly a main reason why central provident funds in Asia are reluctant to offer annuities.

III.2 Managing the investment risk

In a world of homogenous and time-invariant survival rates, the business concerns of insurers would be limited to having a sufficiently large risk pool of annuitants and to having assets that best match annuity-related liabilities.

With an immediate and nominally fixed annuity (and well-known survival rates), the liability side of the insurer is well defined and the cash requirement known well in advance. The perfect hedge is an asset that matches these flows and returns, such as a high-quality bond from government, enterprises, or mortgage institutions. With a perfect hedge, the insurer essentially eliminates any investment and liquidity risks.

For a subset of advanced economies, in recent decades there was little issue with the supply of government and select corporate and mortgage bonds (which had higher returns but also a somewhat higher risk) in terms of sufficient size and maturity, particularly in the U.S. and the U.K. (which remained the largest and most sophisticated annuity market). For other

markets, such as Germany, the maturity of government bonds (*bunds*) was gradually extended, reaching 30 years; the new issues envisaged for 2014 of 30-year *bunds* is small (€7 billion), amounting to some 3.4% of overall *bund* issues. Hence, there was seemingly no constraint on the asset side to limit the supply of “plain vanilla” life annuities.

Regarding the supply of price-indexed bonds as a matching asset to price-indexed annuities, the situation was somewhat different. While price-indexed government bonds gained some popularity due to the higher inflation rates of the 1980s, the supply was restricted to a few countries and even there the share in all bonds was rather limited and the maturity never reached more than 30 (?) years in a few countries.⁵ This may have been a binding supply constraint but it is not clear if there was a strong demand for CPI-indexed annuities. The low demand may have been the result of the higher price for the latter, and consequently, the much lower annuitization rate at retirement. *Ceteris paribus*, an annuity that guarantees constant payout in real terms initially offers in nominal terms about a 25% lower annuity level, even assuming a low annual inflation rate of 2%, a retirement age of 60, and a remaining life expectancy of 25 years. Apparently without appropriate framing, only very risk-averse individuals seem convinced of the virtues of an annuity in real terms.

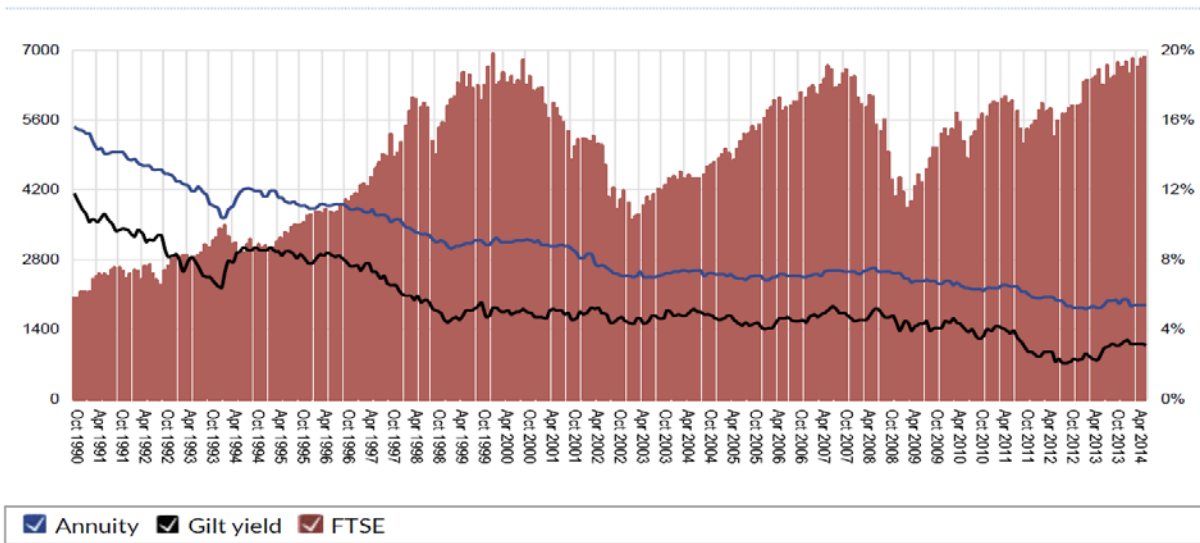
With the financial crisis of 2008, the situation in advanced economies changed in various ways: (1) the belief that government bonds are a risk-free asset was shattered (again); (2) the maturity of government bonds was significantly curtailed and has grown only slowly since⁶; (3) there is strong belief that the low (real) level interest rate will become the new norm to address the high level of public debt; and (4) there is strong anticipation of a future spell of higher inflation. The impact of falling bond yields on the annuity rates is very visible in the recent past, but this development started in the U.K. well before 2008 (Figure 2 and Figure 3).

For emerging economies, the management of annuities is likely to be much more challenging as neither condition mentioned earlier is met: the survival probabilities are not known, and a sufficiently developed financial market does not exist to offer government and high-quality enterprise bonds for asset/liability matching. With only very few exceptions, most emerging economies do not have good demographic data, including on their mortality/ survival rates (despite what the UN demographic projections suggest). And even if they were available for the country as a whole, the data would be of little relevance for annuity providers as their potential clientele has quite a different survival profile. As their markets for annuities are extremely thin or non-existent, they have no reliable data of their own to price the product.

⁵ The most liquid instruments are Treasury Inflation-Protected Securities (TIPS), a type of U.S. Treasury security, with about \$500 billion in issuance. The other important inflation-linked markets are the U.K. Index-linked Gilts with over \$300 billion outstanding and the French OATi/OAT€ market with about \$200 billion outstanding. Germany, Canada, Greece, Australia, Italy, Japan, Sweden, and Iceland also issue inflation-indexed bonds, as well as a number of emerging markets, most prominently Brazil. Source: http://en.wikipedia.org/wiki/Inflation-indexed_bond.

⁶ Regarding the latter, in a world of low nominal interest, it is not that governments would not want to issue many more very long-term bonds, but market demand remains limited.

Figure 2: U.K.: Annuity Rate, Gilt Yield, and FTSE



¹ Male aged 65, £10,000 purchase, single life, guaranteed 5 Years and with level payments.

² Yield on 15 year gilts.

³ The FTSE 100 Index is a share index of 100 most highly capitalised UK companies listed on the London Stock Exchange

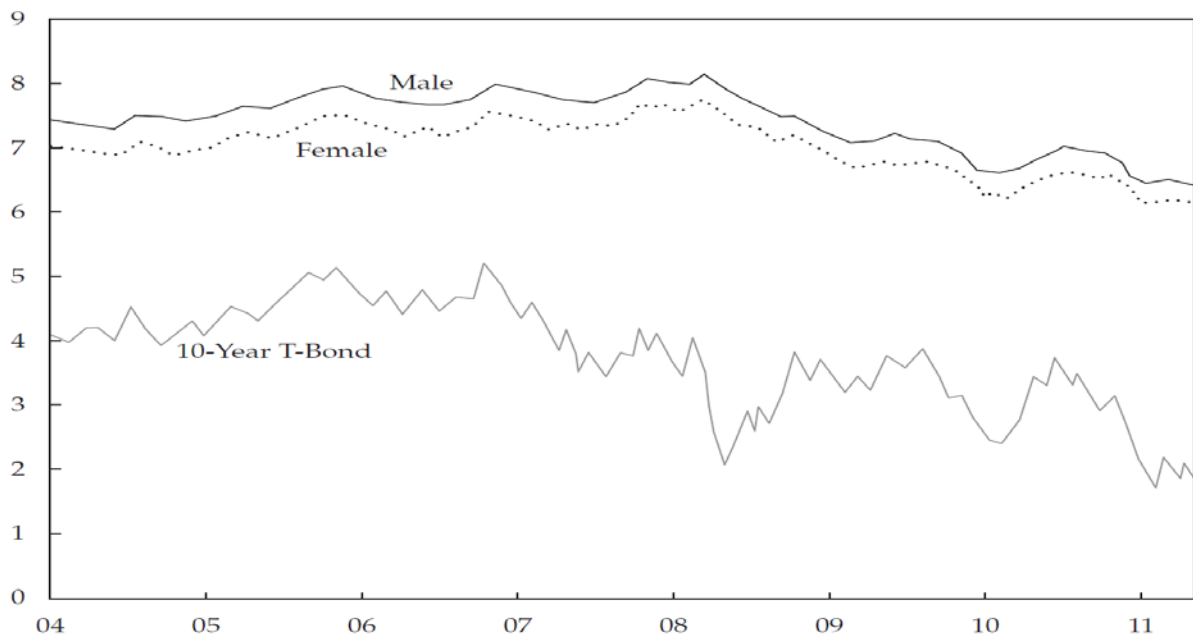
This chart shows how annuity rates and gilt yields move in parallel. This should come as no surprise as annuity rates are priced in relation to the yield on gilts and corporate bonds.

The chart also shows how FTSE has moved over then same period. Notice the so-called double whammies in 2000 and 2008 when both annuity rates and stock market fell at the same time.

Source: http://thisismoney.bgl.co.uk/Graphs/GILT_FTSE

Figure 3: U.S.: Life Annuity Payout Rate versus 10-Year Treasury Rate, 2004–2011

Rate/Yield (%)



Note: Yearly measurements taken on 14 September.

Source : Milevsky 2013.

In addition, most of these countries do not have a competitive capital market in which the return to government bonds reflects market forces. While the central bank may have gained some level of independence, the market for government resources is still very much political

and thus volatile and short term. In addition, the number of providers is limited and often government dependent. Thus the conditions for providing fairly priced annuities are not the best and the demand is very low, not surprisingly.

III.3 Managing aggregate longevity risk

The increase in life expectancy at birth and at retirement is a new phenomenon to mankind, dating as recently as around 1800 in advanced economies, and one likely to persist (Holzmann 2013b). While the frontier of the most advanced life expectancy across countries has been astonishingly linear since 1840 (Oeppen and Vaupel 2002), the underlying development of mortality rates is neither linear nor homogenous across socioeconomic groups and even aggregate life expectancy is difficult to predict (Alho, Bravo and Palmer 2013).

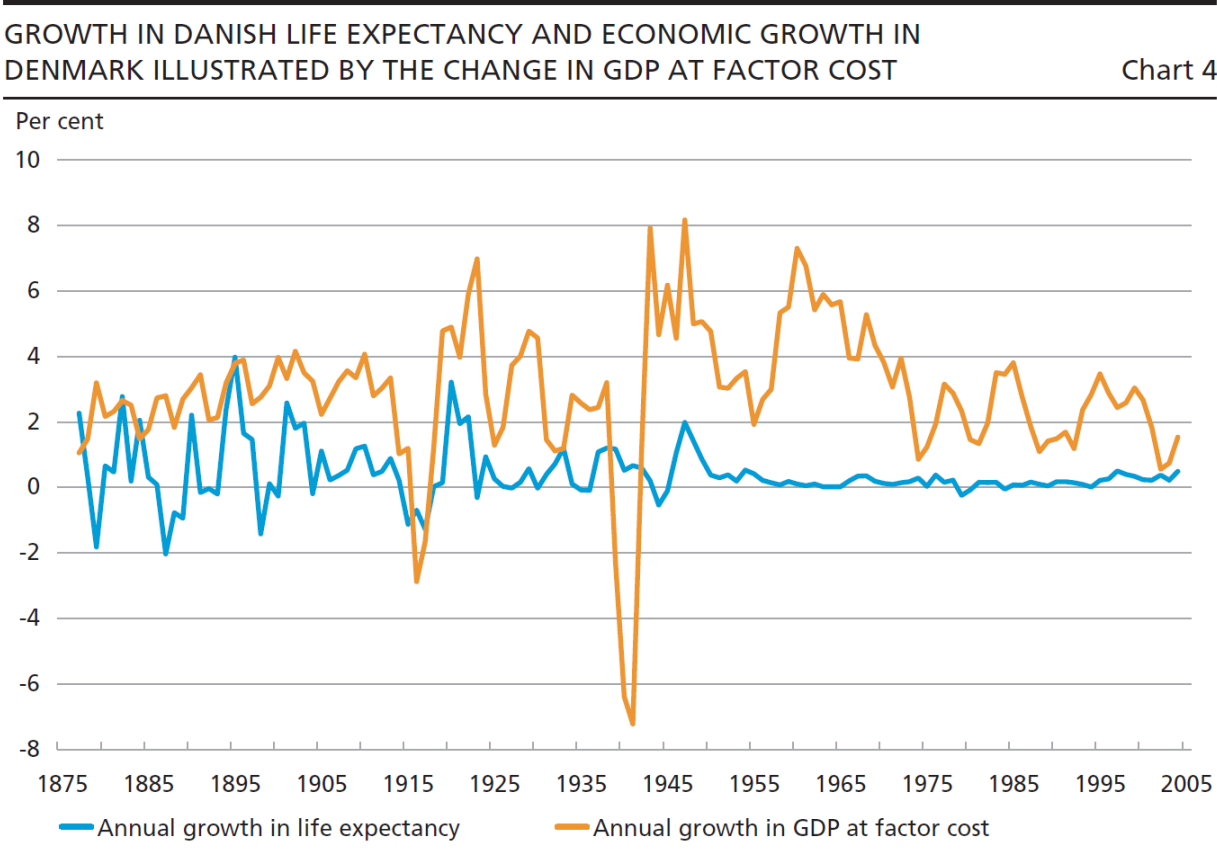
Addressing the aggregate longevity risk poses a main issue for annuity providers as ideal hedging instruments do not exist or possible alternatives increase the price. The imperfect and incomplete instruments comprise some internal pooling of unknown size within the insurance company through the joint business of life-term and life-annuity products, and a larger reserving requirement for the provider that would increase the annuity price.

Longevity bonds (LBs) are considered by some economists as “ideal” matching assets (such as Antolin and Blommestein 2007, Blake 2001 and Burrows 2001, Blake *et al.* 2007, and Blake *et al.* 2010). Ideally these bonds should transfer the aggregate longevity risk from insurers, reinsurers, and DB-providing pension funds to the capital market. The basic structure for such longevity bonds proposed by Blake *et al.* (2007) is simple: bond coupons are payable each year depending on the proportion of a given pension cohort alive that year; there is no principal repayment; and the maturation is 40 years after issue. Since 2003, there have been issuances of mortality-link securities, yet much less than expected: An European Investment Bank scheduled LB in 2004 got eventually canceled; the first traded and rated LBs by Swiss Re’s Kortis’ 2010 was small with \$50mil max payout and 472bp over 6m Libor; and Aegon (NL) in 2012 bought EUR300 million, with a second deal envisaged. All these deals do not reflect initial design idea nor suggest wider replication that begs the question: Why are market-based LBs not taking off? One could argue that from an investor’s perspective (hedge seller) as well as from an issuer’s perspective (hedge buyers) the proposed product has quite limited attraction.

Successful historic market launches of new instruments had a fair balance of notable demand and supply interest. But for LBs, no natural investor would truly benefit from countervailing developments, i.e. gain if life-expectancy were to develop below expectations. The often quoted example of the pharmaceutical industry that could benefit from hedging against a below expectation increase in life expectancy is too small to carry the weight, and the hedging arguments are not convincing. Furthermore, the longevity risk profile seems not interesting for financial investors. On one hand, the low volatility and long duration (compared to, say, the mortgage credit market) should be of interest to some market participants (see Figure 4). The low correlation between longevity and financial risk should be attractive for investors in the asset management sector as it reduces the aggregate investment portfolio risk and requires limited risk premium. However, standardization on how to estimate future developments in life expectancy is difficult and this raises the risk premium. And the long duration and lack of liquidity require a high liquidity premium. As a result, the financial instruments presented so far have been highly complex, with a maturity

of some 25 years, and are risk capped. And there is doubt about the capacity of the reinsurance institutions to cover a large tail risk or distribute it to the market (say, a medical break-through resulting in a sudden increase in life expectancy of 5 plus years).

Figure 4: Growth in Life Expectancy vis-à-vis Growth in GDP in Denmark



Note: Life expectancy is measured as a weighted average of life expectancy at birth, calculated on the basis of estimated mortality rates.
 Source: K. Abildgren, Monetary Trends and Business Cycles in Denmark Since 1875, Working Paper 43, Danmarks Nationalbank, 2006, and Human mortality database
 Source: XXX.

The LBs as proposed seem to be of little interest to the insurance and pension sector, as they have not been behind the launch of bonds (except, perhaps, in the U.K.). The main reasons advanced for such hesitance are the different needs/capacity/regulations by insurance companies and pension funds to address the (basic) risk; the instruments presented so far are not hand-tailored to the specific needs/risk profile of annuitants (i.e., only partial longevity hedging is provided); and there seems to be a conflict between buyers' interest in reducing basic risks and investors' interest in standardization and marketability. This may explain why many more deals between pension funds and investors are done via hand-tailored swap arrangements (see <http://www.ipe.com/>).

For this reason, a number of economists have proposed the government as a market maker (similar to the development of long maturity and inflation-indexed bonds as private sector benchmarks) and even as a long-term provider of LBs (as the only institution that can bear the risk and facilitate intergenerational risk-sharing). The main counterargument to the government as provider of LBs is simply that it already has large exposure to longevity risk through social security and pensions for public employees. But there are also a number of good arguments for it; as government would receive the longevity risk premium (i.e.,

revenues) and could control risk (e.g., by increasing the retirement age), the action contributes to more efficient annuity markets and thus may save welfare resources; further, the issuance would be a small fraction of total government bonds (Blake *et al.* 2007).

If none of these efforts to provide appropriate matching/hedging instruments succeeded, the ultimate approach would be to give up the pretense to be able to offer immediate and fixed annuities and to share the aggregate longevity risk with current and future annuitants. Public and also enterprise schemes increasingly seem to be implementing increases in retirement age and balancing mechanisms that affect benefit indexation and notional interest rates (in NDC schemes). For example, the Dutch pension funds have started to move from an FDB scheme toward an NDC-type system with a large reserve fund.

III.4 Alternatives to traditional annuity products

If the demand for traditional annuity products remains low or the supply limited, what are the key alternatives to offer individuals some or perhaps better protection against the uncertainty of death? An increasing number of products coming on the market have the name “annuity” in their title, but actually have little to do with annuities; to complicate matters, the name and content vary by country and over time. To focus on key issues, we will discuss three: Phased Withdrawals; Variable Annuity with Guaranteed Lifetime Withdrawal Benefit; and Advanced Life Deferred Annuity.⁷

Phased Withdraws (PW)

Phased withdraws are the voluntary alternative or default option to lump-sum withdrawals in many voluntary and mandated DC schemes, and they are also the mandated alternative in some mandated DC schemes unless annuitization takes place.

Their key purposes are: to reduce the risk of running out of resources at higher ages (and then have recourse to basic public provisions); to profit for a longer period of time from an equity premium in the investment portfolio; and to postpone the annuitization decision to higher ages. Applied alone, the PW will typically not be an effective instrument to avoid running out of resources at higher ages (or to leaving unintended bequests) even assuming a substantial difference between the rate of return in the savings account and annuity; the mortality premium is quite powerful and rises with age. But in combination with other instruments – other wealth and/or public annuities – it can be a seductive alternative.

Countries use different formulas that often change over time to permit or ordain PW arrangements. For example:

- **U.S.** - 4R rule: The initial annual withdrawal is 4% of retirement savings; subsequent withdrawals equal the initial dollar amount plus cumulative inflation. Such a withdraw structure should provide a sustainable annual spending plan for some 30-35 years (O’Flynn and Schirripa 2011).
- **Chile:** The mandated annuity is at least at the level of the (old) Minimum Pension Guarantee/the (new) Basic Solidarity Pension, or else a PW at basic level with actuarial adjustments is permitted until accumulated resources are exhausted (since the 2008 reform) to reduce gaming and motivate annuitization (Rocha, Vittas, and Heinz 2011, Chapter 8).

⁷ For a discussion of the many more economic and financial risks individual retirement savings are exposed to, and the key instruments to address them, see Bravo and Holzmann (2014).

- **Australia:** There are a number of diverse tax-favored “income stream” products to get people away from a “lump-sum” mentality, with complex rules including taking account of life expectancy (Rocha, Vittas, and Heinz 2011, Chapter 3).
- **Malaysia (EPF):** Account holders 55 years and older (soon 60+) can keep and withdraw at will with no fixed formula but also no requirement to withdraw at any age (Holzmann 2014).

Variable Annuity with Guaranteed Lifetime Withdrawal Benefit (GLWB)

This annuity-type product is essentially a mutual fund to which some minimum income guarantees, such as a guaranteed lifetime withdrawal, can be attached. As it is structured, it promises the best of all worlds – liquidity, as minimum surrender penalties do apply; access to the equity premium, as one participates in the upside potential with step-ups based on market performance; and downside protection through lifetime income. Clearly such a package must rival life annuities. But does it work?

The initial caution with its arrival in the U.S. some 10 years ago was gradually overcome and the number of products sold increased. A few market observers raised caution on some of the design details as they offer only a nominal guarantee and one may do better in a simple withdrawal plan. The product itself is complex and cannot be easily valued, as analytical solutions are not available and in simulations the policy values prove highly sensitive to various individual assumptions and parameters (Mikus 2014). More recently, providers have started to draw back from the market as the guarantee became too expensive.

The mechanisms applied to get out of the contract reportedly include (Milevsky 2013b): increase the insurance fee to the regulatory maximum to chase people away; restrict the asset allocation, forcing everyone to hold an (expensive) balanced bond portfolio; bribe people to lapse or surrender by offering them a (small) lump sum; sell this special business to a (much) lower rated insurance company, or threaten to do so; and if all else fails, default (or ask for a bailout).

The lesson from this (unfinished) GLWB story is that an economic guarantee has a price that is often underestimated by the individual, is difficult to value and price by the provider, and is seemingly even more difficult to supervise by the regulator. Hence the proposed alternatives to traditional life annuities may not be able to deliver.

Advanced Life Deferred Annuity (ALDA)

This deferred annuity product offers income protection at higher ages (say from 80+) for down payments made around retirement age (say 65). The idea behind ALDAs is threefold (Milevsky 2005): (1) the high survival probability from 65 to 80+ can make self-annuitization of assets during this period a superior approach; (2) the deferred profits from investment returns during this waiting period plus the higher “mortality credit” (as the annuity starts at a much higher age) lead to an attractive full coverage at an interesting price; and (3) the product offers longevity insurance while keeping some access to liquidity.

At plausible levels of actuarial unfairness, numerical simulations indicate that households should prefer an ALDA to both immediate and postponed annuitization, and an optimal decumulation of un-annuitized wealth (Milevsky 2013a). This new product thus should increase the demand for longevity protection through annuities. But the product does not ease any supply constraint, as the challenges for managing the investment and aggregate longevity risks still remain.

In the U.S., this product reportedly sells in record numbers and is now offered by all main insurance companies. However, the attraction is mainly through the tax-free accumulation of returns achieved during the waiting period. Once the annuity age is reached, individuals are not forced to take up an annuity but can receive a lump-sum payment instead.

IV. The Role of Government

The key role of government in economic policy is twofold: to address market failure and to redistribute income according to political objectives. The prior sections have highlighted the importance of private sector annuities and the potential welfare gains that may be achieved through a better level and match of annuity demand and supply; these sections have also highlighted the many constraints that establish the effective annuity demand by individuals and/or supply by private sector providers well below its conjectured welfare-economic potential.

The deficiencies in the current annuity market and the expected positive externalities in a fully workable one call for government interventions for allocative reasons. In addition, public interventions that improve intertemporal markets also have large intra- and interpersonal redistributive effects if measured in welfare terms of their monetary equivalent (Holzmann 1990). The reasons are simple: functioning intertemporal markets such as for annuities offer higher welfare gains to poorer individuals than to richer ones as the latter need them less and have other alternatives available to them.

The scope and intensity of useful government interventions, and the welfare effects achievable, will depend very much on the existence of other instruments to address the longevity risk, particularly the other pension pillars: the zero pillar to address old-age poverty issues; the first pillar as a publicly provided, intertemporal consumption-smoothing device; and the fourth pillar to offer complementary public services (health care, housing) and family support at advanced ages (Holzmann and Hinz 2005). The stronger these pillars, the lower the welfare gains obtained through private annuities.

The role of government in the provision of annuities can thus be manifold and ranges from facilitator on the demand and supply side to private annuity market maker (as well as for asset markets conducive to that) to annuity provider if the private market fails to deliver.

In my view, to do so requires first and foremost a political decision by government about the role private annuities should play in a retirement product landscape. The political vision is critical in this “chicken and egg” problem. Such political support explains the high annuitization in, say, Chile and Switzerland as a result of public nudges and advocacy in demand and public interventions to ensure adequate supply. In turn, the low annuitization in, say, Australia and Malaysia is conjectured to primarily reflect a lack of political interest in and support for annuities that then translates into ignorance and low demand at the consumer level and a lack of interest and supply by financial markets.

There are 10 main areas where government interventions may be needed to establish a reasonably functioning annuity market if a decision to this end is made:

- (1) First and foremost, a life annuity market needs a functioning capital market that builds on a sufficiently deep and liquid market of government bonds of appropriate maturity; the longer the better, with 10-year bonds as a minimum. Price-indexed government bonds should be provided at one moment as this is the only credible basis for annuity providers to offer price-indexed annuities.

- (2) Creating universal access to validate data and statistics on longevity-related events (mortality, morbidity) by demographic characteristics is critical for efficient pricing and to limit information asymmetries. Standardized measures on longevity trends and changes are critical for engaging capital markets in risk allocation.
- (3) Annuity markets need government regulation and supervision due to main information asymmetries and gaps that increase with longevity. Capital market product innovations and the crowding out of actuaries by financial economists has changed the landscape and calls for new approaches (e.g., risk-based supervision).
- (4) With market partners, government should formulate a consistent vision on (future) retirement income provisions across pillars, defining the permissible/suggested payout option for mandated/ voluntary savings accumulations and reviewing the decision environment, including the setting of default options.
- (5) Government needs to ensure consistency across interrelated policy areas, particularly tax policies across funded and unfunded pensions and accumulation and decumulation phases, accounting rules, capital market regulations, etc. Without such a consistency, the demand and supply of retirement products risk being determined by arbitrage considerations rather than the underlying benefits of the products.
- (6) If and as government decides to offer guarantees for relevant annuity (and savings) products, the guarantee needs to be objective-driven and evidence-based, with appropriate co-insurance and caps reflecting incentives and fairness considerations.
- (7) There should be an explicit process and political decision on centralized or decentralized annuity provisions based on evidence-driven assessments of private sector capability and public sector capacity to establish transparency and integrity.
- (8) Similarly, there should be an explicit process and political decision on the public facilitation or provision of hedging instruments for annuity providers, such as price-indexed government bonds and longevity-indexed securities.
- (9) Government has a role in establishing the decision environment of individuals for annuity products, with advocacy, public marketing, and appropriate nudges.
- (10) Similarly, government has a role in offering general and facilitating specialized financial education to allow individuals to make decisions across their lifecycle and about annuity products (and government should think about mandating a financial “driver’s license” for those making such key financial decisions).

V. Conclusions

This paper explored the role and limitations of private sector life annuities in addressing the individual and aggregate longevity risk. To this end we used the demand and supply framework to explore the respective binding constraints and identify the short market side. While demand investigations are plenty in the literature, supply analyses are more limited, and the interaction and impact still largely treated at theoretical level or through model simulation. Qualified empirical work on the supply/demand interaction is sparse and the cross country knowledge on annuity markets remains limited. This is little helped by the loose use of the notion “annuity”.

As regards the demand side, we are not any closer to a solution of the “annuity puzzle” than 10 or 25 years ago when it was raised for the first time to prominence in a Nobel award

acceptance speech. What we may have succeeded in is a better categorization of the issues involved. There is still a strong and credible view that annuity alternative through government and family but also strategic bequest motives are a main deterrent for private annuity demand. However, the views on the empirical relevance of the main links of explanation differ across authors in and between countries, including the question how much annuitization of wealth is actually optimal. What has been added over the last 10 years are many good arguments and papers so that behavioral limitations of individuals may credibly explain a sizable part of the annuity puzzle. A most recent acquisition of explanations concerns the role of financial knowledge and more broadly financial capability in the low demand for life annuities. For both newer aspects – behavioral limitations and lacking financial knowledge – randomized controlled trials offer hope to shed more light on the relevance of constraints and the effectiveness of interventions to overcome them.

As regards the supply side, the key aspects of supply restrictions have also not changed in recent decades; actually more recent developments have made them more relevant. The key supply restrictions are regulatory constraints and constraints to address the investment risk and the (aggregate) longevity risk. When these constraints are effective they restrict product features, such as lacking price indexation, or simply drive-up the price of the annuity. A solution to strengthen the supply incentives and capabilities for annuity providers consists in sharing more of the risk between annuitant and provider as this reduces the regulatory burden and the cost of reserving, and risk sharing makes the product less demanding with regard to the asset/liability match. However, at the same time the guarantee elements of the traditional annuity product is reduced, eliminating much of attractiveness life annuity had in the past. The sharing of risks creates also new regulatory issues as the intermediate stages of risk sharing are much more open to interpretation and dispute. Another approach of better addressing both investment and longevity risks consists in exploring better the role and scope of deferred annuities. Any failure to come-up with good solutions will favor the emergence of claimed annuity substitutes, or will put pressure on the government to take part of the annuity business back.

In view of the many deficiencies on the demand and supply side of annuities, there is ample of role for government to get involved and address market deficiencies as regulator, market creator and facilitator, information creator and mediator, etc etc. But the role of government in private sector annuities may be conjectured to go well beyond that. Efficient annuity provisions require political will and a policy of strong coordination. Only then will traditional supply, product innovation and market-based risk diversification take place. But this requires government to take a position and decision that private sector annuities are welfare enhancing and thus needed. But governments may claim they do not have the empirical base to take such a position and to guide interventions based on solid evidence.

Suggested key elements of an operational policy research agenda for moving in this direction include

- i. Understanding latent consumer demand using modern exploration techniques (Decision State Models, Discrete Choice Experiments, etc)
- ii. Data and models on longevity developments
- iii. Testing product innovations with rigorous analytical approaches (RCT)
- iv. Investigating service annuities at advanced ages (long-term care and beyond), reverse mortgages innovations, et al

- v. Risk diversification through reinsurance and capital markets – exploring potential and limits

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