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On annuities: an overview of the issues

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1. Introduction

Fully-funded pension arrangements have two stages: accumulation and decumulation. The decumulation stage offers pensioners different financial products to access resources. The most frequent device in English-speaking countries is the lump sum, followed by deferred withdrawals and the purchase of annuities from life insurance companies.

The annuity is an old instrument whose origin dates back to ancient Rome. Contracts, known as *annua*, promised an individual a stream of payments for a fixed term or a lifetime in return for an up-front payment. The purchase price was expressed as a multiple N of the annual income. Single-premium life annuities became available in the Middle Ages. During the 1700s, governments in several nations, including England and the Netherlands, sold annuities in lieu of government bonds. In 1808 the UK government launched its modern annuity finance program: the government received capital in return for a promise of lifetime payouts to the annuitants (Poterba, 2001). The modern annuities market, in which private insurance companies sell insurance contracts to individuals who wish to avoid the risk of outliving their resources, emerged in the 1700s, together with the development of probability and finance theories (Cannons and Tonks, 2008).

The annuity provides unique longevity insurance, but instead of being a popular instrument for reducing uncertainty on earnings at advanced ages, the market is thin. Part of the narrow scope of this financial product has to do with demand-side features, as well as with the supply side. There are also open issues in the regulatory arena to debate. Our overview of the theoretical and empirical literature shows that despite the theoretical appeal of the instrument, both sides of the market—demand and supply—tend to avoid it. Savers are reluctant to cede an important share or their entire savings in exchange for a policy and prefer alternatives with greater risks. Providers are encountering difficulties in annuity pricing given the expectancy of life is lengthening.

In this paper, we aim to discuss the main issues concerning annuities from a less technical perspective. Section 2 focuses on the demand side of the market. Section 3 presents an analysis of the supply side of the market. Section 4 discusses some regulatory aspects and Section 5 concludes.

2. Demand for annuities (or “Why not buy an annuity?”)

The pay-as-you-go systems (PAYG) had been increasingly supplemented or replaced by savings, thus implying a potential demand for annuities. The reforms in pensions have shifted from pay-as-you-go *defined benefit* (DB) public systems to supplemental or substitute fully-funded *defined contribution* (DC) private arrangements.

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In 11 OECD countries, mandatory private pensions have replaced public pension provision; two countries have included mandatory private pension savings in existing public plans; and many countries have reformed their public pensions, enabling greater voluntary private savings. In English-speaking countries, and in other OECD's ones like Belgium, Germany, Japan and Norway, at least 40 percent of the employees are currently covered by voluntary occupational pension plans.

Radical pension reforms have also been implemented in emerging countries in Latin America, Central and Southern Asia, and Central and Eastern Europe (OECD, 2007 a and b).

Individuals also appear to respond to lower replacement rates by making higher voluntary savings. The traditional means to encourage voluntary savings for retirement has been through tax incentives; new approaches rely on the findings of behavioral economists about the natural inertia of the people (OECD, 2007 b, Cannons and Tonks, 2008)

In 2006 the total OECD funded pension market (occupational plus personal) was valued at US\$ 24.6 trillion or 72.5 percent of its GDP. Two-thirds was held by pension funds, 17.7 percent was held in retirement products provided by banks or investment management companies, 14.1 percent was held in pension insurance contracts (run by life and pension insurance companies) and 2.1 percent were "book reserves". Bonds and stocks remain the two most important asset classes for pension funds and accounted for half of total investment in most countries in 2006 (OECD, 2007 c).

Upon retirement, participants in DC schemes have to decide how they will employ their assets. Traditionally, developed countries pay benefits from DC schemes either as lump sum withdrawals or as some form of life annuity. Other possibilities exist: programmed or phased withdrawals and programmed withdrawals followed by mandatory annuity conversion. Some European countries only permit annuities and, in some cases, combine them with cash withdrawals. An annuity is a series of payments made at intervals until a particular event happens (such as the death of the holder –Single Life Annuity– or the lives of more than one person – Joint-Life Annuity). Overall, it involves a single premium to an insurer. A deferred annuity is one that is postponed until some time after issuing. It is generally an amount of money that can be used to buy an immediate annuity (An Bord Pinsean –The Pensions Board, 2004). A life annuity purchase is consistent with the simplest form of a life-cycle consumption model with no bequest motive, while some retirees choose to preserve part of their assets for use other than purchasing an income stream. Annuitization is generally an irreversible decision. Davidoff et al. (2003) extend the classic results from Menahem Yaari's 1965 seminal work on annuitization without his restrictive assumptions. According to their findings, for complete annuitization to be optimal it is only necessary that consumers have no bequest motive and that the annuities pay survivors a rate of return net of administrative costs, which is greater than the return on conventional assets of matching financial risk.² Ameriks (2003) uses historical data from major DC pension providers to assess the decisions of the participants between 1978 and 2001. His results illustrate that there is a demand for more flexible and innovative products. He finds that there was a decline in the use of the life-contingent immediate annuity following the introduction of non-annuity income options in 1988 (Ameriks, 2003).

Consumers have shown a growing tendency to select new (and more flexible) options. As more customized options have become available, many participants have chosen more than one income option, starting with one and following with another: they use temporary mechanisms

² For technical considerations on the demand theory of annuities, see Cannon and Tonks (2008).

that need not involve life contingencies and receive only the necessary minimum amount of distributions to avoid federal tax penalties (Ameriks, 2003).

Mackenzie (2002) makes a list of the possible causes for the small size of annuities markets:

- 1) The existence of substitutes.
- 2) The bequest motive.
- 3) Unforeseen large expenditures (such as medical care and nursing).
- 4) The high cost of annuities due to adverse selection (“annuitants live longer”).
- 5) The underestimation of personal longevity, myopia or misunderstandings about the properties of annuities.

Because of economies of scope and as life annuities and life insurance are mutually natural hedges, a comparative advantage exists for life insurers in this business. Interestingly, a life insurance company will not be able to determine the profitability of its contracts with a given cohort of retirees until most of them have died.

Uncertainty is also present in the demand size of the market. A standard assumption in investment risk studies associated with personal accounts is that retirement income per accumulated dollar is a given, but annuity premiums are, in principle, a function of bond yields and can vary considerably over time. “The DC plan participant cannot be certain before he annuitizes what premium he would have to pay for a given stream of annuity income” (Mackenzie and Schager, 2004).

An alternative to an immediate annuity is the “phased withdrawal”, which can be set according to a fixed benefit level (until death or the exhaustion of the funds) or by using a variable formula (where the withdrawals are linked to life expectancy). The advantage of a phased withdrawal strategy, which allocates resources across various mutual funds comprising different assets, is liquidity and it can be bequeathed in the event of early death. However, it does not provide the pooling of longevity risk.

A fixed benefit rule of withdrawal is considered in Dus et al. (2003), together with three specific withdrawal rules that generate varying benefits: the fixed percentage rule, the $1/T$ rule (T being a number of periods that the annuitant is expected to live) and the $1/E(T)$ rule ($E(.)$ being the mathematical life expectancy of the annuitant). In the second case, one method sets T equal to the oldest age assumed in a mortality table; another is to fix it as the retiree’s life expectancy at the time of retirement. The third rule, takes into consideration the retiree’s remaining life expectancy in a dynamic way. This rule has been used in the US during the decumulation phase of 401(k) plans whereby the tax authority seeks to ensure that retirees consume their tax-qualified accounts instead of bequeathing them.

The results of simulations from Dus et al. (2003) on different paths of phased withdrawal suggest that some retirees prefer a mixed strategy: to undertake phased withdrawals during the early period of retirement and then switch to an annuity. It enhances the payout early on –with a relatively low risk– and also includes the insurance feature later in life. Some national regulations established compulsory annuitization after a stipulated age. Hu and Scott (2007) apply the lessons of behavioral finance to understand how anomalies, which are well documented in decision-making under risk, can explain the absence of lifetime annuity purchasing by retirees. A natural replacement of guaranteed lifetime income that was formerly provided by DB pensions is a

lifetime annuity purchased with retirement savings. However, there is virtually zero voluntary annuitization beyond the payouts provided by social security and the defined benefit pensions.

Purchasing an immediate annuity entails a slight probability of losing all of the initial investment (if death occurs immediately after signing the contract), while longevity (deferred) annuities may lead to the likelihood of no payouts at all. One essential behavioral difference between immediate annuities and longevity annuities is the weight attached to their worst outcomes. Behavioral investors emphasize the low probability of early death in their calculations, which can result in a near-complete loss of the initial investment, and loss aversion makes this outcome even more unpalatable. The most popular annuities are those which guarantee a minimum number of payments. The guarantee period seems to minimize the anxiety associated with possible early death after the annuity investment is made (Hu and Scott, 2007).

Scott et al. (2007) demonstrate that efficient annuity allocations concentrate annuity-funded consumption late in life through delayed annuities instead of immediate ones. Since retirees are averse to acquiring large annuity purchases, delayed payout annuities could significantly improve retiree welfare.

3. The supply of annuities: What kind of business is this?

Annuity contracts can be immediate, deferred, single-life, joint-life, indexed, variable, temporary or laddered (purchasing annuities in increments to smooth annuity purchase rates). Those who purchase an annuity by investing in insurance contracts face an “open market option” that enables the purchaser to deal with any insurance company operating in the market. The purchaser can be an individual or a group (such as the trustees of a pension scheme). Under European regulations, an annuity is considered life insurance and can only be bought from a life insurance company. One that is bought out of a pension scheme is called a “Purchased Life Annuity” and persons wishing to secure long-life additional benefits opt for it (An Board Pinsean –The Pensions Board, 2004).

Categories of annuity products include (Pugh, 2006):³

- 1) Single premium, flexible premium (funded by a series of periodic payments or contributions that can be fixed or variable).
- 2) Immediate or deferred payout. Flexible annuities are only deferred.
- 3) Fixed (or nominal) payments, variable payments (linked to a group of mutual funds –sub-accounts), equity-indexed (to a stock index). Fixed annuities guarantee the principal and a minimum rate of interest over a specific period.
- 4) Fixed-term, entire life annuity, temporary annuity, guarantee annuity.
- 5) Qualified provider (those in which the accumulation and payout phase provider is the same) and non-qualified provider whereby the provider in the payout phase is different).
- 6) Single coverage, Joint-and-survivor (for couples. After the death of the insured, the survivor continues to receive the income streams).
- 7) Individual purchase. Group purchase (such as some occupational plans).

³ More complex and more expensive annuities exist. For a detailed list and explanation, see Cannon and Tonks (2008).

- 8) With certain guarantees: against longevity risk, investment risk, interest rate risk and inflation risk.
- 9) Others: With tax advantages (generally, the capital and investment proceeds are tax-exempt while the annuity payments are subject to income tax), enhanced versus impaired annuities (for persons with a shorter life expectancy), and inflation-indexed annuities.⁴

The primary objective of variable annuities is to protect the insurance company or other providers from non-anticipated longevity improvements. Payments are adjusted downwards to reflect changes in the average remaining life expectancy of the annuitants, who see their longevity risk increase.

Longevity insurance is equivalent to the purchase of a deferred annuity at retirement, where the optimal deferred period approximately equates the average life expectancy of the annuitant. Only those who live beyond the deferment date will collect the periodic payments, payable during their lifetime. It is estimated that retirees need only spend about 10-15 percent of their capital on such longevity insurance, and they can use programmed withdrawals or self-manage the remaining 85-90 percent.

Ameriks (2003) examines pensioners' behavior from the Teacher Insurance and Annuity Association-College Retirement Equities Fund (TIAA-CREF), the largest pension provider in the US. The assets are accumulated as a part of an employer-sponsored pension arrangement rather than a supplemental one. Participants generating life-contingent income can access two types of annuities: single-life or joint-life. Annuitants, who perceive the "risk" of early death as a loss of assets, can choose a "minimum payment period". During the guarantee period, income payments from the annuity are not life-contingent. The implicit cost of private annuities fluctuates over time and between providers, depending on the individuals' perceptions of their mortality. The provider under study offers variable annuity payments (on group mortality and assets performance), using a current mortality table, an estimated 4-percent interest rate, and combinations of a guaranteed minimum income with a variable payment, as its typical product (Ameriks, 2003).

In both OECD and middle-income countries, the providers of annuities are typically insurance companies, but in developed markets the number of insurers selling annuities has fallen. The annuity business can be particularly unprofitable (low investment returns and increasing longevity, coupled with high reserve requirements). Conventional life insurance companies have some natural advantages supplying annuity products as they can derive economies of scale from their overall life insurance business and from their strong internal actuarial and administrative skills and experience. In many countries, insurance companies are also involved in the pre-retirement accumulation phase. But the retiring members can shop around for the best annuity rate.

The funds invested in a variable annuity in the US market are held in sub-accounts, independent of the insurance company's other assets. Consequently, they are not subject to claims by insurance company's creditors under insolvency. Income earned on the annuity investments is tax-deferred until the individual begins to withdraw. Some minimal death benefit has to be included in the contract for it to be eligible for favorable tax treatment. The tax deferral known as "*1035 Exchanges*" generates most of the sales in the industry: it can be

⁴ Blake et al. (2006), examine the alternative of the longevity bonds. These can take the form of annuity bonds whose annual coupon payments were tied to the survivorship index of some reference population.

applied via a direct transfer of accumulated funds in an annuity policy to another without creating a taxable event (Brown and Poterba, 2004).

Variable annuities can be purchased both inside and outside of retirement plans. Purchases using non-retirement plans are called non-qualified annuities. The insurer offers a range of sub-accounts in which the assets can be invested, equities and bond portfolios being the most common alternatives. The purchase can be made with a single initial premium payment or with a sequence of payments. The insurance company collects two fees: an investment management fee and an insurance charge, which covers a variety of risks. Penalties are applied if funds are withdrawn earlier than a specified period, generally seven years (Contingent Deferred Surrender Charges). Fees are substantially larger than those on open-end mutual funds holding similar assets (Brown and Poterba, 2004).

Life annuities provide longevity insurance but purchasers lose liquidity and control over their assets; they have no chance to leave a bequest. In Germany “Riester Plans” offer tax incentives to allocate voluntary savings in individual pension accounts, which allow holders to withdraw 20 percent of accumulated assets as a lump-sum distribution upon retirement. The rest of the resources can be invested in a lifelong annuity (provided by insurance companies) or a phased withdrawal plan (offered by mutual funds or banks), which must partly revert to an annuity at the age of 85. In the UK a portion of the accumulated asset can be taken as a lump sum, while the rest has to be employed to buy an annuity by the age of 75 (until 2006). At the age of 69 Canadian retirees must buy an annuity or create a managed withdrawal plan. Instead, the US requires no mandatory purchase of annuities for 401(k) plans at retirement. Many workers deposit their funds into an Individual Retirement Account (IRA), which they themselves manage (Dus et al. 2003).

An annuity is a good choice if you exceed the average life expectancy; it is not if interest rates grow after signing the contract or the priority is to secure some capital for surviving relatives. The advantages of lump-sum are several: to start a personal business, to liquidate debts (like mortgages), to leave a bequest and to cover large medical and emergency costs at retirement. Programmed withdrawals became a popular alternative to life annuities when long-term bond yields were low and the corresponding price of life annuities was high. In countries where annuitization was mandatory, regulations were relaxed to help delay the annuity purchase in a volatile environment. In more volatile places like Latin America, the programmed withdrawal choice was included in the pension reforms.⁵ Another disadvantage of annuities is their issuance cost (Pugh, 2006).

Despite an increasing need for annuities (owing to aging, decreasing social security pensions –which are, in fact, indexed life annuities, DC new schemes, and so on), these markets are still underdeveloped in many OECD countries. Well-developed markets are found in Australia, Canada, Switzerland, the UK, the US, the Netherlands, Chile and Singapore.

On the supply side, insurance companies are increasingly unwilling to offer these products or to do so at attractive prices; reinsurance companies are unprepared to take on these risks. The reasons are many. Problems setting a price arise from increasing longevity. Mortality projections do not abound and some countries are using foreign mortality tables. Insurers face the risk that mortality rates will fall faster than their calculations and reserves. Annuitants tend to live longer than the population at large. When the annuitization is not mandatory, the problem of adverse selection complicates their calculations. In theory, the business of life for an insurance

⁵ For a comparative study on ten Latin American private pension systems, see Ferro (2009).

company can offer a hedge against low profitability in annuities. Although mortality can improve business, the proportion of insured persons is not commensurable. Annuity providers also have trouble matching assets to their liabilities. The risks involved are credit risk, liquidity risk, business risk, investment risk and longevity risk. Public debt and well-rated corporate ones could offer hedge in longevity risk but indexed securities, in particular, are not abundant (Stewart, 2007).

The final outcome of a life table is the mean number of years still to be lived by a person who has reached that exact age if subjected throughout the rest of his life to the current age-specific probabilities of dying (Antolin, 2007). The increase in survival rates in the mid- to late 1900s was not accurately predicted. Some UK life insurance companies have reportedly underestimated the average life expectancies of their pool of annuitants by up to two years. Insurers cannot insure themselves against changes in life expectancies that affect entire generations; so, given the state of knowledge, life insurers have little choice but to be conservative.

A fair trade?

A growing body of research has studied the extent to which the annuity premiums differ from the present discounted calculation of the annual stream that the annuity promises weighted by the survival probability of annuitants of a given age upon purchase of the annuity. They use the expected risk-free interest rate as the discount rate (public debt in developed countries; when the retirees face high levels of freedom to allocate their retirement savings, the actual rate of discount could, in fact, be higher). Those studies calculate the Money's Worth Ratio (MWR) or the ratio of the present discounted value to actual premium cost⁶ (Mackenzie, 2002). See Table 1 for some examples. The MWR is the value of the expected annuity payments that would be received if the annuity were to purchase at \$ 1. Supposing there were no administrative costs or profit for the insurer, the fair value of an annuity would be 1 (or 100 percent). Given the actual costs and profits, we can expect an MWR slightly less than 1 (Cannons and Tonks, 2008).

The MWR is usually less than one in empirical research and is consistently higher than that of the general population for the annuitant population because of adverse selection ("annuitants live longer"). The former is especially true in the US and UK markets. In other markets, such as Canada, Switzerland or Singapore, the MWRs yield above one. A maturity mismatch between the available bonds to hedge annuity liabilities or investment in assets other than public debt offers the insurers the possibility to compete with attractive premiums but at the cost of a higher interest risk. In Switzerland, in addition, annuities have a non-guaranteed component, which, in fact, implies that payments are not fixed.

⁶ MWR = C/Actual Premium in the Market

$$C = \sum_{i=1}^n [A d / (1+r)^i]$$

Where C = present value or cost of the policy, A = fixed payment, n = maximum number of years an individual survives after purchase of the annuity, r = assumed constant rate of interest, d = the probability that the individual survives to the *i*th year after retirement.

Calculations are sensitive to the discount rate, which is related to the rate the insurer can obtain from investments. If these are concentrated in public debt, the discount rate is expected to be lower than if corporate bonds back the portfolio. As a consequence, MWR calculations using the public debt rate as the discount rate will yield better results for the annuitants (and a worse implicit spread for the insurer).

The MWR calculations assume no trading costs and no indivisibility problems in the relevant financial instruments or fixed commissions. These features possibly underestimate the implicit opportunity cost in the discount rate for a single annuitant. The ratio $1/\text{MWR}$ is the load factor for the annuity. MWR “does not take account of an annuitant’s aversion to penury in old age”. According to Panis (2003), on analyzing the pre-retirement expectations and post-retirement well-being of Americans, the guaranteed income benefits would reduce anxiety over the risks of asset depletion by outliving one’s savings. The major drawback of a life annuity, in that sense, seems to be irrevocability (Mackenzie, 2002).

	Australia		Canada		UK		US	
	General population	Annuitant population	General population	Annuitant population	General population	Annuitant population	General population	Annuitant population
Male 65, using public bond rate or yield curve	0.914	0.986	0.925	1.014	0.897	0.966	0.816	0.916
Female 65, using public bond rate or yield curve	0.914	0.970	0.937	1.015	0.910	0.957	0.829	0.893
Male 65, using corporate bond rate or yield curve	0.846	0.906	0.869	0.947	0.854	0.916	0.742	0.825
Female 65, using corporate bond rate or yield curve	0.839	0.885	0.874	0.941	0.860	0.901	0.745	0.797

Source: Mackenzie (2002), based on James and Vitas (1999) and Mitchell et al. (1999)

James and Song (2001) calculate the MWR and find that, when discounting at the risk-free rate, MWRs for annuitants are surprisingly high: greater than 95 percent in most countries and sometimes greater than 100 percent. How do insurance companies cover their costs despite these high MWRs? By taking portfolio risks, insurers can earn a spread that covers their costs. Employing risk-intermediation and term-intermediation techniques, they can convert their risky portfolio into one that is almost risk free. For consumers who would prefer to accept this investment risk and capture this spread themselves, the appropriate discount rate is higher and the MWR is lower, helping to explain the low demand for annuities in voluntary markets.

The US has experienced a rise in the growth of mutual funds, the expansion of self-directed retirement accounts and a decline in annuitization in retirement, resulting from the shift away from automatically annuitized DB plans and towards DC plans, few of which even offer annuities as benefit options. Variable annuities have grown in the form of contracts combining equity ownership and an option to annuitize. Insurance companies introduced variable annuities in the mid-1950s to compete with mutual funds. Annuity sales grew faster than net flows in this market as many variable annuity contracts were terminated and their assets were transferred to new annuities. Variable annuity schemes are attractive for reasons of tax legislation, not to mention that they provide various forms of insurance and the option to convert a life annuity with

the payouts indexed on the performance of a diversified investment portfolio. The returns on assets held in variable annuities are not taxed until the holder receives a distribution from the annuity. The funds accumulated in variable annuity accounts are seldom converted to life contingent annuities at retirement. Many insurers provide other guaranteed death benefits, like the highest value on the anniversary of purchase, minimum growth guarantees and include such features as firm or contract specific. Ownership of variable annuities in the US is highly correlated with income and net worth. Older households are more likely to own variable annuities and ownership rises according to the educational level. But compared to other financial assets, variable annuities are less concentrated across education, income and wealth distribution, and more concentrated among the elderly (Brown and Poterba, 2004).

Until 1978 the UK only had a flat basic benefit in its public system, together with a state earnings-related component (SERPS) in the public system. However, it allowed employers to opt out if they could offer their own pension plans that met specified standards. Small employers sometimes used insurance companies to handle these pensions, giving rise to a pension-annuity business. In 1988 individual workers were allowed to opt out of SERPS or their employer's plan and set up their own personal savings plan. At present, the majority of workers are registered in privately managed plans. Workers are required to annuitize a portion of their contributions at some point between the ages of 65 and 75. Additionally, they can purchase annuities using their voluntary savings. The compulsory annuities market represented in the 1990s is ten times the size of the voluntary market (Cannons and Tonks, 2008).

Switzerland has a basic benefit scheme with a progressive formula that benefits the low earners; since 1985 mandatory employer-sponsored plans have been in effect for all workers except low earners. Upon retirement, the government determines how this accumulation will be annuitized at a tightly regulated price. An insurance company chosen by the pension fund or the employer often provides the annuity. Lump sum withdrawals are allowed but tax treatment favors annuitization.

In Australia, a flat benefit that is broad-based but means- and asset-tested has become almost generalized. This has been supplemented by collectively bargained pension plans. In 1992 the government made these employer-sponsored plans mandatory, covering all but the lowest earners. Annuitization is one of the options to withdraw the money accumulated in these accounts upon retirement and the decision rests with the worker.

Singapore has no public cash benefit for the elderly, but some subsidies have been means-tested for housing, medical care and so on. The basis of retirement income is the number of contributions made to the Central Provident Fund, founded in 1955. In 1987 the government instituted the Minimum Sum Scheme: at the age of 55, workers must set aside a sum to buy a deferred life annuity payable at age 62, deposit it in a bank or leave it in the hands of the Central Provident Fund for gradual withdrawals. The annuities market has shown rapid growth.

Chile's annuities market proves to be the largest in the James and Song sample (2001), relative to GDP. Two factors enabled the annuities market to get off to an early start, even before the new pension system had matured: the recognition bond, and disability and survivors insurance provided through the private market. A regulation also exists offering workers the possibility to retire early if they have enough savings to purchase an annuity that exceeds 110 percent of the minimum pension and also exceeds 50 percent of their average wage over the last 10 years. Annuitants rose from less than 10 percent of all beneficiaries in 1988 to over 50 percent in 2000.

Israel has a universal flat benefit for every resident over the age of 65. Supplementing the former are DB arrangements put in place by unions, which are heavily subsidized by special non-tradable government bonds in which the funds have been fully invested and pay an above-market interest rate. In 1997 the subsidy was reduced; the bonds could only cover 70 percent of the reserves and benefits were changed to age-specific deferred non-guaranteed annuities that had to be adjusted frequently to remain actuarially sound. Israel also has a small voluntary annuities market mainly for managers, which is not covered by union schemes.

More details on national cases can be found in Cannons and Tonks (2008).

How do insurance companies cover their costs? The company gives the annuitant a fixed payment and preserves the residual of investment earnings. This is a spread business. However, the higher spread comes at the expense of a riskier portfolio. Therefore, the risk-free rate may not be properly suitable for discounting. It is difficult to assess the return on investment portfolios of the annuity business alone since this business is usually merged with other insurance business, especially life business.

In a reconstruction of investment portfolios of life insurance companies in a number of countries (the US, Switzerland, Canada, the UK, and Australia) over time, James and Song (2001) find that fixed-interest securities almost invariably exceed 50 percent of the portfolio, public bonds being generally less than half of this amount with most of the fixed-interest portfolio invested in corporate bonds, mortgages and loans. Equities in the portfolios exceed 25 percent in most industrialized countries in the sample. Insurers reduce risk by diversifying in a large portfolio –including foreign assets, using derivatives and other hedging techniques, sharing risks across different product lines, managing information and providing liquidity via its continual cash inflow to make it less vulnerable to market-timing risk. They can shift risk by reinsurance (rare in annuities), resorting to annuity guarantee pools, sharing risk and cross subsidizing among annuitants of different cohorts or products.

The key to lower administrative costs at the annuity and accumulation stages of retirement savings plans appears to be lower marketing expenses. This may explain why the MWR is higher in Singapore, for example, where products are standardized and there is less opportunity for marketing and sales commissions than in most other countries. A similar amount may be saved on sales costs when group and not individual annuities are concerned. The chief reduction can come by reducing marketing costs through standardized information and group plans. This can potentially increase the MWR by 4 to 5 percent.

Rocha, Morales and Thorburn (2008) use a panel of Chilean life insurance company data to examine econometrically the main determinants of the annuity rate (defined as the internal rate of return on annuities). The annuity rate is determined by the risk-free interest rate, the share of privately-issued higher yield securities in the portfolio of providers, the level of the broker's commissions, the market share of individual providers, the level of the premium and the degree of market competition. The results are consistent with MWR research. The lack of critical statistical information on annuities markets is due to several factors, including the immaturity of annuities markets in most countries and weak disclosure rules. The performance of the annuities market can be measured by the relationship between the annuity rate (internal rate of return) and the risk-free rate. The estimated reduced form equation explains 80 percent of the variations of the annuity rate across companies and over time. Most of the coefficients have the expected signs. The estimates indicate an existing competitive market. The prohibition of rebates and the regulation on a broker's commissions translated into higher annuity rates. The portfolios

exhibited an increase in higher yield fixed-income assets and lower public bonds participation. These instruments are usually held until maturity.

The results of Thorburn, Rocha and Morales' (2007) analysis of the MWR in Chile show that annuitants have generally profited from their premiums. All the analyzed Chilean annuities were fixed and indexed to prices. There are abundant indexed instruments and the market of annuities has been competitive. The contracts are regulated. Males with spouses have to buy joint annuities and the surviving spouse receives 60 percent of the payment after the death of the main beneficiary. Guaranteed annuities are possible and popular in Chile since they offer the spouse more protection and some element of bequest.

The authors studied 5,137 old age retirement and early retirement annuities awarded between March 1999 and March 2005. The MWR is over 1 (the fairly priced annuity) from 2002. There is a significant variation in individual MWRs. The MWRs of joint annuities are lower than those of single annuities, and the MWRs of single male annuities are lower than those of females. The MWRs of older annuitants are systematically higher than those of younger annuitants, regardless of gender. There is a positive relationship between MWRs and the size of the premium. MWRs of guaranteed annuities are smaller than those of non-guaranteed annuities. Finally, deferment periods seem to make little difference in the value offered to the customer, although deferments are short in the Chilean case.

A major development in the annuities market was the passage of the new Pensions Law in 2004, introducing a cap on broker's commissions and an electronic quotation system that allows easy and transparent comparisons of annuity and phased withdrawal prices. There was a fall in the broker's commissions and a decline in the dispersion of MWRs, especially in the annuitants with lower premiums and incomes. International comparisons reveal that Chilean annuitants are better off than annuitants in other countries, especially considering that Chilean annuities are indexed.

Decreasing mortality threatens the annuity business

Mortality patterns change over time and between countries as well. There are two approaches to project future longevity: the extrapolation of past tendencies or the estimation of causal models for different groups of people, using explanatory variables such as habits (smoking, sports activities, diet), and genetic information (Cannons and Tonks, 2008). US and UK data are relatively consistent and numerous other developed and developing countries have adopted their tables. US mortality tables tend to be used in the Western Hemisphere and British tables are applied in the former British colonies. Local actuarial adjustments are applied to the tables to better reflect local situations. Uncertainty regarding mortality tables can cause insurance companies to raise prices. Developing local mortality tables has an element of public good (Mitchell and McCarthy, 2002).

The comparison of two tables uses the ratio A/E, which expresses the anticipated number of deaths in a given group with a specified age structure using one mortality table and compares these to the expected number of deaths in a population of the same size using a second mortality table. To address adverse selection problems, UK insurers have developed separate mortality tables for both voluntary and compulsory-purchase annuitants, each of which differs from that of the general population. The data indicate that voluntary annuitants experience much lower mortality than do compulsory annuitants. An estimation for ten countries (and 500 million lives) found that an average degree of adverse selection for annuitants versus the general population

exists for at least 25 percent. This difference lies in the order of the difference between males and females in the population at large. The cohort effect is much smaller, in the order of 12 percent lower mortality. Patterns are different between countries. Regulatory policy regarding mortality tables can drive both the demand and supply of annuities. The insurers, who lack good quality estimates of mortality, tend to price annuities conservatively, exacerbating adverse selection problems and lowering access to annuities markets. Regulations regarding how mortality data are used are also key to shaping the annuities market. The common mortality table combined with mandatory annuitization restricts the potential for adverse selection (Mitchell and McCarthy, 2002).

Phased withdrawals and annuities

Horneff et al. (2006) derive the optimal retirement portfolio from a menu that includes payout annuities, as well as investment allocation and a withdrawal strategy, assuming risk aversion, stochastic capital markets and uncertain lifetimes. They find that compulsory annuitization can lead to substantial losses for less risk-averse investors. Available evidence from most countries points out that very few retirees actually purchase annuities with their disposable wealth. In a context of non-mandatory annuitization, people could believe it optimal to invest their retirement assets and make periodic withdrawals. The retiree must select both an investment strategy and a withdrawal rate. Financial advisors often recommend “rules of thumb”: X percent in bonds, $(1-X)$ percent in stocks, and a periodic withdrawal of w percent per year ($X = 0.6$ and $w = 4$ to 5 percent of initial wealth is common advice). But that strategy may not protect against longevity and poses investment risk for the retiree. The possibility of linking the withdrawals to the fund balance each period may protect against the risk of running out of money but it can introduce fluctuations in the retiree’s income (Horneff et al., 2006).

A mixed strategy is appealing, for example, allowing withdrawals up to a certain age and mandating annuitization at some time in the future. In the UK up until 2006, annuitization was mandatory by age 75 and Germany offers a tax inducement in Riester plans to purchase life annuities at age 85. In the US annuitization is not compulsory for 401(k) accounts. Most retirees roll their funds over to an IRA and manage the funds themselves, subject to the tax laws requiring minimum distributions beginning at age 70.5. Horneff et al. (2006) show that the appropriate mix depends on the risk aversion of the retiree, as well as on assumptions regarding the capital market and actuarial tables. They find the fixed percentage rule leads a wide variety of risk preferences, and this preference decreases with risk aversion. Only the very risk-averse will ever find the fixed annuity appealing *ceteris paribus*.

Sharpe et al. (2007) examine some rules of thumb from financial advisors to see whether they are consistent with the expected utility maximization. If a rule is consistent, they say it is efficient and refer to the underlying utility as the investor’s revealed utility. The canonical setting assumes: the preferences are well modeled by additive and separable utility functions, spending preferences take into account mortality estimates and the retiree’s attitudes concerning his spending relative to that of any beneficiaries, and the amounts to be spent under the plan will go either to the retiree or to the beneficiaries. They also assume that no annuities have been purchased.

Many advisors recommend that retirees annually adjust their portfolios by decreasing their exposure to equities, thus reducing their overall risk. This strategy is known as glide path,

an age-based investment strategy. A classic example is the rule $(100 - \text{age})$ for the percentage of assets allocated to equities. But these schemes are inefficient unless specific spending criteria are adopted at the same time. An efficient retirement strategy must be totally invested in the risk-free asset to provide constant spending in every future state. Retirees interested in fixed retirement spending should invest in the risk-free asset. Anyone who chooses to invest in the market should be prepared for more volatile spending.

Immediate annuities were purchased in 2006 in the US for around US\$ 6 billion of the estimated US\$ 236 billion in deferred and immediate annuity sales in the same year (that is, less than 3 percent). Some facts reduced the demand for annuities: the generosity of social security, family support and the bequest and precautionary motives explain retirees' behavior. The contingent expenses make annuities a "risky asset" for annuitants facing health shocks. The demand for various financial products varies as a function of the strength of the precautionary motive and the bequest motive.

Rates of voluntary annuitization remain extremely low. Webb et al. (2007) propose an innovative annuity product –the Advanced Life Deferred Annuity (ALDA), which provides relatively high longevity insurance at a relatively low cost. It is an annuity that would be purchased upon retirement, or even earlier, but the associated payments would not start until an advanced age (for example, 75, 85 or 90). The long deferral period would result in a very inexpensive product; for example, Webb et al. (2007) calculate a cost of no more than 15 percent of the wealth at age 60 would produce ALDA payments commencing at age 85.

The timing of the purchase of an annuity impacts on its payments. As a result of volatility in interest rates, individuals are exposed to variations in the premiums at the time of retirement. Two strategies arise: one is a planned program of phased annuity purchases in the period leading up to retirement, using the principle of dollar cost averaging (a constant rate of purchase). A more sophisticated form is protected annuity funds, which employ derivative instruments (Yermo, 2001).

4. Regulatory issues

Financial regulation, such as economic regulation in general, rests on the market failure perspective (Stiglitz, 1994). Efficient results can be derived from competitive markets in the absence of natural monopolies, externalities, public goods and/or asymmetric information. In financial markets, competition could be implemented easily, but asymmetric information, many externalities and some knowledge exist, which could be qualified as public goods.

In the pensions and insurance arena, free riding, moral hazard and adverse selection could arise, in addition to fraud and malfeasance from asymmetric information. Due to the former, some markets disappeared (or never developed). Since there are incomplete markets for the possible contingencies with some coverage, regulation is important to fostering markets as well as to protecting the consumer of financial services. Providing financial education has elements of a public good. Borzi and Patterson (2007) explore different retirement strategies given that the majority of private DC plans in the US are yielding a lump-sum to their retirees and the lack of financial skills of the former exerted pressure on the regulators to protect the pensioners from making bad decisions. They emphasize the role of information disclosure and financial consumer education.

The regulation of annuities is essential to ensuring the integrity of the system that comprises: the prudential regulation of insurance companies, the conduct of the business regulation of insurance companies and the regulation of annuities within the overall pension system. Regulation in the financial markets is designed to protect consumers in areas too complex for them to protect themselves (Davis, 2002).

Risky portfolios are transformed into risk-free outflows by means of risk-reduction and risk-shifting approaches. In terms of risk reduction, insurers employ investment diversification, including foreign assets, derivatives or hedging (if allowed by regulation), risk sharing across product lines whose risks are orthogonal –such as annuities and life insurance, lower information costs than for individuals owing to specialization, and the use of cash inflows to provide liquidity. In terms of risk shifting, there is reinsurance, annuity guarantee pools, risk sharing between cohorts of different products notably in for-profit policies, using shareholders as residual claimants and bankruptcy laws giving annuitants high priority (Davis, 2002).

The prudential regulation of insurance companies affecting annuities is directed, in particular, at the regulation of solvency and asset regulation, as well as compensation schemes. Entry regulation is also a feature. The key protection device against insolvency is reserves and capital adequacy. The main focus of solvency regulation is on reserves and investments held against the capital base. Assets held as reserves are constrained by the characteristic risk of liabilities. The prudential regulation of reserves requires a focus on prospective liabilities based on existing contracts. The main issues are the mortality assumptions, the discount rate (based on an investment-backed contract and whether there is immunization or matching) and future expenses to cover the full-expected costs of administration. Besides reserves, the firm must hold capital and surplus assets to cover unexpected shocks (Davis, 2002). Unlike traditional policies, variable policies imply active investment in equities, real estate and international investments, which may be expected to keep pace with inflation. The related assets may often be held in the form of mutual funds. Overall, bonds are used to back nominally-fixed products.

The choice to regulate insurance (and pension fund) asset portfolios is between the prudent person rule and quantitative asset restrictions. In the latter case, constraints are typically applied on assets with high price volatility and/or low liquidity. The prudent person rule stipulates that investments should be made that are managed “prudently” (as someone would do in running a business). For institutions selling nominally-fixed liabilities, matching with assets of a similar duration may be a desirable portfolio policy. Instead, to cope with interest rate risks, they can be evaluated in the context of the portfolio composition as a whole (immunization features) and not asset-by-asset as in the case of quantitative regulation. Most of the life insurance sector, notably in Europe, has quantitative restrictions. The UK is the exception. The restrictions come at a cost in terms of average real or nominal returns on the asset portfolio. The standard deviation of real returns is identical for both kinds of regulation (Davis, 2001).

Capital adequacy and reserving requirements impose a floor on the price policies given a desired return on capital. Since solvency requirements are more and more risk-based, they impact on the supply side of the more complex annuity products. On the demand side, the complexity of products complicates the consumers’ choices, in part for their lack of understanding about the options involved. Individuals demand flexible financial products and transparency. Individuals have to decide whether they prefer more protection or higher flexibility and a chance for higher profits. Some annuities can be conceptualized as DC in character, those that pass investment and demographic risk on to the individual (Stewart, 2007). In terms of product design regulation, the

basic choice is between strict controls of products, maintaining a standard design and even price controls, and allowing free innovation along with information for consumers. Tax authorities are another strong force in helping to standardize and regulate the options (Davis, 2002).

The main risks in annuities are related to mortality and interest-rate assumption, credit and other broader systemic risks. The risks for the provider are policy discontinuation, and the degree to which returns on the portfolio match the promised income stream and the quality of the mortality assumptions. Self-selection is likely since annuitization is voluntary. Life expectancy is showing a tendency to rise one year every 4 to 5 years in the UK, where annuitization was compulsory until only recently. The conventional annuities contracts in English-speaking countries are nominal-fixed contracts. To address the adverse selection in the annuities markets, annuities purchases could be made mandatory or could force the decision to choose a lump-sum payment instead of an annuity to be made before retirement, substantially reducing the effects of adverse selection (Pugh, 1996). Given the choice between a lump sum and other retirement options, the great majority is expected to opt for the lump sum. The US has registered figures as high as 96 percent in occupational plans. However, there is a fine line between the encouragement through moral persuasion and paternalism. Paternalism reflects myopia; free choices entail a risk for governments, the exhaustion of the funds by private agents, and the need for their public aid (moral hazard).

One element to consider when deciding on compulsory annuitization is whether the pension funds replace social security or supplement it. If the funds are supplemental, it is more reasonable to leave the choices more open. In some countries, programmed withdrawal is the only option since no developed annuities markets exist. But Chile's example is eloquent in the sense that a vibrant annuities market developed after social security was privatized.

Mackenzie (2002) provides some general advice to countries considering issues such as the restrictions on the timing, extent and form of withdrawals from individual accounts and the need for mandatory annuitization of accumulated account balances. A government has to take two decisions when privatizing social security concerning the decumulation phase:

- 1) Should there be restrictions on the distribution of the accumulated savings, such as mandatory annuitization?
- 2) If annuitization is mandatory, should it be privatized?

In the case of mandatory annuitization, how should the degree of annuitization be determined? Compulsory annuitization discourages improvident behavior, free-riding and adverse selection. But, *"If annuity purchase is mandated, the government may have to devise exceptions to the general policy, and institutions or procedures to minimize abuse or gaming"* (Mackenzie, 2002).

Tax provisions are a key element in designing incentives in one direction or another. It is contradictory, instead, to give a favorable tax treatment to forms of payment that the government does not wish to encourage. Some limits could be set, like a maximum lump sum after a minimum replacement rate is achieved with annuitized pensions.

5. Concluding Remarks

The growth in retirement savings implies a potential demand for annuities, but the markets of this instrument remain thin in the limited group of countries where that market exists. Our overview of the theoretical and empirical literature shows that despite the theoretical appeal of the instrument, both sides of the market, demand and supply, avoid it. Savers are reluctant to cede an important part or their entire savings to an insurance company to buy a policy. They prefer alternatives like the lump sum or deferred withdrawals with the risks these options entail. Providers have difficulties pricing annuities given the ongoing longevity rate and the risks are not easy to measure. The annuities market lies mostly in compulsory purchases. Regulation can help if we are convinced that the certainty of income for the elderly is a public value and that the pensioners are myopic. A decision to choose a lump sum has individual rationality but entails the probability of moral hazard on public (or taxpayers') resources. A mandate to annuitize is a measure to deal with moral hazard. But the issue is sensitive if we agree, on the other hand, that savers are sovereign and that mandatory annuitization narrows their options. The empirical research in the few countries where the annuities market has developed sheds light on the complex trade offs involved. Voluntary markets, in turn, exhibit adverse selection, as can be expected.

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