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Designing the Payout Phase of Pension Systems

Policy Issues, Constraints and Options

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Abstract

This paper examines the policy issues, constraints and options facing policymakers in promoting the development of sound markets for retirement products. It discusses the various risks faced by pensioners and the risk characteristics of alternative retirement products and also reviews the risks faced by providers of retirement products and the management and regulatory challenges of dealing with these risks.

The paper focuses on policies that could be adopted by developing and transitioning countries where financial

and insurance markets are not well developed. It argues for promoting an adequate level of annuitization but avoiding excessive annuitization. It also argues for favoring combinations of payout options, covering different products at a particular point in time as well as different payout options over time. The paper also discusses the choice between centralized and decentralized markets and highlights the basic elements of an effective regulation of risk management.

This paper—a product of the Non Bank Financial Institutions Group, Global Capital Markets Development Department, Financial and Private Sector Development—is part of a larger effort in the department to study pension systems and the development of markets for retirement products. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at rrocha@worldbank.org and dvittas@worldbank.org.

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Non Bank Financial Institutions Group Global Capital Markets Development Department Financial and Private Sector Development The World Bank

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Roberto Rocha and Dimitri Vittas

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Preface

This paper on 'Designing the Payout Phase of Pension Systems: Policy Issues, Constraints and Options' is part of a broader project on life annuities and retirement products, coordinated by Roberto Rocha, Senior Adviser at the Finance and Private Sector Development in the Middle East North Africa Region, and former Manager at the Financial and Private Sector Development Vice-Presidency of the World Bank. The paper is published by Global Capital Markets Non Bank Institutions of the Financial and Private Sector Development Vice-Presidency of the World Bank. The project was initiated in 2004 to fill an apparent gap in the pension literature, especially in the literature addressing the payout phase of defined-contribution pension systems.

Many countries that have implemented systemic pension reforms and introduced private pension systems are now facing the challenge of organizing the payout phase for retiring workers. This entails introducing a well-regulated market for retirement products, covering the effective regulation and supervision of retirement products, marketing activities, providers and intermediaries. However, the literature on the payout phase is generally focused on a few countries and topics and does not address in sufficient detail the institutional and regulatory issues faced by policymakers in reforming countries.

The World Bank project fills this gap by reviewing in detail a number of representative country cases, including Australia, Chile, Denmark, Sweden, and Switzerland. These countries have large mandatory or quasi-mandatory private pension systems operating primarily on a defined-contribution basis and have already entered the payout phase. Moreover, their institutional and regulatory arrangements for the payout phase are different in many aspects, including decentralized and centralized arrangements for the provision of life and term annuities, different menus of retirement products, different approaches to price regulation and risk sharing, different marketing rules, and different capital rules for providers. Therefore these countries provide a rich variety of experiences and policy lessons for other reforming countries.

Five studies covering each one of these countries have already been completed (Andersen and Skjodt, 2007; Brunner and Thorburn, 2008; Buetler and Ruesch, 2007; Palmer, 2008; and Rocha and Thorburn, 2007). The current paper addresses policy issues, constraints and options in designing the payout phase with particular focus on developing and transitioning countries that have reformed their pension systems. A companion paper (Rocha, Vittas and Rudolph, 2010) provides a comparative summary of the experience of the five countries covered in this project and the lessons they offer for other countries. A summary and update of the Chilean study has also been prepared (Rocha and Rudolph 2010).

Executive Summary¹

This paper covers a wide range of complex and challenging issues dealing with the development of sound markets for retirement products. It discusses the various risks faced by pensioners and the risk characteristics of alternative retirement products and also reviews the risks faced by providers of retirement products and the management and regulatory challenges of dealing with these risks. The Executive Summary pulls together the main conclusions of the paper, with particular focus on policies that can be adopted by developing and transitioning countries where financial and insurance markets are not well developed.

A first point that policymakers should bear in mind is that pensioners face several risks and some of these risks pull in opposite directions. Examples are, on the one hand, longevity and bequest risks and, on the other, investment and liquidity risks.² A clear implication of this is that policymakers should target an adequate level of annuitization but should be weary of causing excessive annuitization.

A second point is that the various retirement products have their own risk characteristics and suffer from important shortcomings. Because of these shortcomings policymakers should favor a combination of payout options, covering different products at a particular point in time as well as different payout options over time.

Mandating complete reliance on fixed real (inflation-protected) annuities should be avoided for two reasons: fixed real annuities are costly in terms of low real returns³; and they require access to an ample supply of long-duration inflation-indexed bonds, which are lacking in most countries.

However, it is essential to require a minimum level of annuitization through fixed real annuities. The public sector is best equipped to handle the offer of minimum-level fixed real annuities through a universal pension benefit (Australia, Denmark, New Zealand as well as Chile since 2008 for the lower 60 percent of the income distribution of households), a social security pillar (most OECD countries), or a minimum pension guarantee for second pillar benefits (Chile before 2008).

fixed nominal annuities would be smaller (see section 2.2.1 below).

¹ We are grateful to Estelle James, Gregorio Impavido and Heinz Rudolph for their extensive and insightful comments. We are also indebted to our collaborators in this project, including Carsten Andersen, Gordon Brunner, Monika Buetler, Ed Palmer, Martin Ruesch, Peter Skjodt and Craig Thorburn, for their direct and indirect contributions to this paper. The usual disclaimer applies.

² Purchasing life annuities protects against longevity but eliminates the possibility of bequests, while investing in long-term assets addresses the investment risk but exposes their holders to liquidity risk.

³ The real return on inflation-protected securities tends to be low, mainly because such securities are in most countries issued only by governments (Chile is a notable exception). If long-term inflation-protected corporate and mortgage bonds were also available, the differential in real returns between fixed real and

⁴ The Chilean pension system underwent a major transformation in 2008. A brief summary of the main changes that are germane to the issues addressed in this paper is provided in Annex 1.

Fixed nominal annuities should not be mandated and should not even be encouraged because they fail to provide protection against inflation. If use of fixed real or variable annuities is not feasible or advisable, because of prevailing conditions in the local financial and insurance markets, then escalating nominal annuities represent an attractive alternative option.

The use of joint life annuities with guaranteed periods of payment deserves public policy support. These products address the bequest motive and the fear of capital loss in case of early death. They also help overcome the problems caused by impaired health and adverse selection. In addition, joint life annuities mitigate the distorting effects of the use of unisex life tables, which is compulsory in European Union countries.

Annuities with guaranteed periods of payment are very popular when they are offered but they do not need to be mandated. However, the use of joint life annuities should ideally be imposed on both working spouses and the reversion rate, the pension of the surviving spouse, should not be lower than 60 percent of the original pension.⁵

Term annuities appeal to pensioners who wish to have higher incomes during the first years of their retirement life. They do not provide protection against longevity risk but they may appeal to workers with impaired health. Term annuities may be included in product combinations once minimum levels of inflation-protected life annuitization are secured and provided the insurance market is reasonably well developed and effectively regulated.

Phased withdrawals also do not provide full protection against longevity risk, but because of limits on annual withdrawals, they stretch balances over a longer period. Phased withdrawals allow for bequests but are exposed to investment and inflation risks. Unlike life and term annuities, they are portable and can be transferred to other financial institutions. Like term annuities, they have advantages for workers with impaired health and a short life expectancy.

A combination of a minimum level fixed real annuity (preferably but not exclusively provided through the public sector) and a life expectancy phased withdrawal merits serious consideration in any country. This combination provides minimum security in old age while allowing participation in the higher returns of market investments. And in contrast to variable annuities, it does not require a major strengthening of regulation and supervision.

Variable annuities, profit participating or unit-linked, with or without minimum guaranteed benefits, have their own merits and attractions. They appeal to pensioners who want to participate in the upside potential of investments in equities and real estate. But their offer requires a robust regulatory framework and a high level of transparency and integrity on the part of providers.

⁵ A reversion rate higher than 50 percent is advisable because of the presence of significant household economies of scale.

Variable annuities are exposed to investment risk and complete reliance on them would not be advisable. Like term annuities and phased withdrawals, they may be included in product combinations once minimum levels of inflation-protected life annuitization are secured and the regulatory framework is sufficiently robust.

Reverse mortgages have many advantages for owner-occupying retiring workers. However, like variable annuities, they require a robust regulatory framework to provide effective protection to pensioners from aggressive selling.

Deferred annuities (with or without refunds), which are purchased at the time of retirement and are payable 10, 15 or 20 years later, are an attractive option in most countries. Because they have greater exposure to the tail end of the age distribution, they are more difficult to price than immediate annuities. In countries with sophisticated insurance markets and reliable mortality data, they may be used in combination with term annuities, phased withdrawals or even reliance on self-annuitization during the deferment period.

Countries that offer a constrained choice to retiring workers and do not mandate the use of a single retirement product for all should also specify the product that will be used as the default option. This will help workers who are unable or unwilling to make a decision on their own and will protect them from abusive selling practices of brokers and selling agents of providers. The use of centralized electronic quotation systems and offer of guidance and advice by regulatory agencies will also contribute to greater consumer protection.

Unlimited lump-sum distributions and the implied complete reliance on self-annuitization should be avoided, unless there are strong cultural factors in their favor. Self-annuitization requires considerable financial savvy by retired workers and is very difficult to manage in advanced old age.

The level of permitted lump-sum withdrawals may be determined either as excess balances once the targeted level of annuitization is achieved or as an upper limit, normally between 25 and 33 percent, of accumulated balances.

The targeted level of annuitization reflects country preferences. A sensible approach is to have a public pension equal to between 25 and 30 percent of economy-wide average earnings for single pensioners (between 40 an 50 percent for married couples) and a targeted integrated replacement rate from the zero, first and second pillars of between 50 and 70 percent of a worker's own average real earnings over the preceding ten years. However, countries that favor the development of voluntary savings may adopt somewhat lower targets.

These integrated replacement rates may also be seen as regulatory thresholds that will determine the level of excess balances that can be withdrawn as lump sums. Their main role is to ensure an adequate level of income over the whole of a person's retirement, while avoiding excessive annuitization.

The public pension should ideally be linked to the growth of average earnings, providing protection against inflation as well as participation in future income growth. The benefit from the second pillar may be a fixed real or an escalating nominal annuity, a variable annuity, or a program of phased withdrawals.

The normal retirement age at which the public pension is payable may be linked to life expectancy at retirement, based on a rule that aims at maintaining a constant ratio between retirement life and active working life.

Annuitization risk, i.e., the risk of low long-term interest rates and high annuity prices at the time of retirement, can be mitigated either by authorizing gradual purchases of annuities or by encouraging gradual portfolio shifts in favor of long-term bonds. In more sophisticated markets, the development and use of adjustable and extendible annuities would also reduce exposure to annuitization risk.

Centralized provision of some services linked to retirement products, such as account administration, benefit payment and risk pooling, has several potential advantages, including a larger base for risk pooling, economies of scale and avoidance of heavy marketing costs. The disadvantages are potentially weaker incentives for operational efficiency and product innovation. Centralized provision of these services may be combined with decentralized asset management.

Countries that favor a decentralized competitive market structure need to monitor closely trends toward growing market consolidation. They need to ensure that profit margins are not excessive and the benefits of greater competition and innovation are not eroded by increasingly oligopolistic and wasteful marketing practices.

Adopting a centralized electronic quotation system to lower search costs and improve the marketing of fixed nominal and real annuities as well as escalating annuities is a high priority. However, the marketing of 'guarantee and bonus' or 'unit-linked' variable annuities through a decentralized competitive market raises major regulatory and supervisory challenges. It is preferable to offer variable annuities through a centralized provider but with decentralized asset management.

The regulation of risk management needs to focus on the maintenance of adequate levels of technical reserves and risk capital. Institutions that offer phased withdrawals and unit-linked products without any guaranteed benefits do not present complex risk management issues.

But for providers of products with guaranteed benefits, the regulatory framework needs to be more complex and robust. There should be requirements for the use of 'fair value' accounting and market-based maturity-dependent discount rates, while the application of stress tests to assess the vulnerability of individual institutions to specified external shocks should also be mandated.

Countries where financial markets are not sufficiently active and liquid should not rely on potentially misleading market valuations. The use of book values should then be allowed but unmatched liabilities of individual institutions should be subject to more onerous technical and capital reserves.

Effective management of the longevity risk in fixed nominal and real annuities as well as escalating annuities requires access to long-duration assets. For the more uncertain tail end of the age distribution, annuity providers should be encouraged to resort to global reinsurance. This will require removal of any asset localization requirements. The use of longevity bonds and longevity derivatives could be encouraged when these instruments become well established in global markets.

The risk-sharing arrangements of variable annuities whereby longevity risk is shared among annuitants offer several advantages. However, the offer of variable annuities requires a high level of transparency and integrity and is best organized through a centralized structure along the lines discussed above.

The introduction of government guarantee schemes covering all types of retirement products merits serious consideration. The government guarantees could emulate evolving practice in deposit insurance schemes, including upper limits on the amounts insured and a reasonable amount of coinsurance by pensioners in order to minimize the possible loss of market discipline at the point of purchase. The potential cost of government guarantees should be estimated and such estimates should be used to determine risk-based premiums on annuity providers.

The high volatility of financial markets, which was recently underscored by the 2008 global crisis, highlights the need for a safety net to cover the accumulation phase at the point of retirement. The offer of a lifetime government guarantee that retirement savings will earn a specified minimum real rate of return deserves special study.

The conditions and other particulars of two options are worth considering: either a minimum zero real rate of return or a specified fraction of the long-run rate of return of specified portfolios. In either case, asset allocation strategies during the accumulation phase will need to follow prescribed principles and patterns to discourage moral hazard and prevent gaming of the guarantees by retiring workers.

In addition, the authorities should compile a comprehensive database of retirement products and should undertake educational programs to expand financial literacy and improve understanding of the main features, cost and performance of different retirement products.

1. Introduction

- 1.1 Many countries around the world have undertaken systemic reforms of their pension systems. Reform programs have in general entailed a significant downsizing of public pension pillars and an expansion of private provision, mainly in the form of individual accounts in defined-contribution plans. Much of the early research on pension systems has focused on the policy challenges of the new systems during the accumulation phase, placing particular emphasis on the structure, performance, and regulation of defined-contribution pension funds, in both the public and private sectors and in both developed and emerging countries. This emphasis has been fully understandable given the paramount importance of ensuring the safety and efficiency of the accumulated phase.
- 1.2 However, as systemic pension reforms reach maturity, the issues and challenges of the payout phase have started to attract attention. This paper addresses the policy issues, constraints and options that policymakers face in designing the payout phase of pension systems and facilitating the conversion of accumulated balances in defined-contribution plans into streams of retirement income, such as life annuities and phased withdrawals. The paper focuses on policies that could be adopted in developing and transitioning countries where financial and insurance markets are not well developed.⁶
- 1.3 The paper starts by discussing the various risks faced by pensioners and the risk characteristics of alternative retirement products. It notes that pensioner risks often pull in opposite directions, requiring caution on the part of policymakers to target an adequate level of annuitization but be weary of causing excessive annuitization. It also highlights the important shortcomings of all types of retirement products and argues for policies that favor a combination of payout options, covering different products at a particular point in time as well as different payout options over time.
- 1.4 The next section reviews the risks faced by providers of retirement products and discusses the different ways in which providers can cope with these risks. The risks faced by governments in operating guarantee schemes to cover minimum levels of benefits and protect pensioners from provider insolvency are also discussed.
- 1.5 The paper then examines the policy options faced by policymakers in developing countries. It first addresses the regulation of payout options in the context of a desired level of annuitization to ensure not only that pensioners do not suffer from abject poverty in old age but also that they maintain a reasonable standard of living in retirement compared to their pre-retirement levels of consumption. This is followed by a discussion of the regulation of providers of retirement products, ranging from the institutional organization of markets to the regulation of marketing and pricing policies and the regulation of risk management. The conclusions of the paper, covering the main points and policy recommendations, are set out in the Executive Summary.

Prieto (1998).

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⁶ Extensive research has been undertaken by many authors, see Blake (1999); Brown et al (2001); Cardinale, Findlater, and Orszag (2002); Davis (2000); Fornero and Luciano (2004); Impavido, Thorburn, and Wadsworth (2003); James et al (2001); Mitchell et al (2001); Palacios and Rofman (2001); and Valdés-

- 1.6 It should perhaps be pointed out that this paper does not address the so-called 'annuity puzzle'. It accepts the view that the historically weak demand for voluntary annuities should primarily be attributed to the presence of social security and company pensions. Other possible factors include the strength of the bequest motive, the tendency of most individuals to underestimate their longevity, the lack of liquidity and flexibility of annuity products, and the irreversibility of annuity decisions. Life insurance business has been able to flourish in countries with well regulated markets, partly because when they purchase life insurance policies, consumers agree to make small periodic payments and receive the accumulated capital when policies mature or their families are protected in case of premature death. But in the case of annuities, consumers have to part with large capital sums for a stream of future income. This is a more difficult decision to make and requires much greater confidence that the decision is correct. Because most annuity contracts, especially fixed nominal or real life annuities, are long-term contracts that are neither revocable nor transferable by the annuitants, sufficient trust in the integrity and solvency of the chosen company becomes far more important than in the case of life insurance business.
- 1.7 Another reason that is often underscored in economic studies of annuity markets is the possibility of adverse selection whereby people with impaired health withdraw from the annuity market, resulting in more expensive annuities for healthy annuitants. The increase in the cost of annuities causes more people to withdraw from the market, resulting in a further increase in annuity prices and eventual market failure.
- 1.8 However, the role of adverse selection in explaining the underdevelopment of voluntary annuity markets is often overstated. After all, risk classification and risk-based insurance premiums are widely used and have been fully accepted in several lines of insurance business, such as home, motor and, especially, life insurance, where people with impaired health are charged higher premiums. There is no reason why risk-based premiums should not or would not also be accepted in annuity business. In fact, insurance companies in several countries have already started to offer special annuities with lower risk premiums that are targeted to people with impaired health. 8
- 1.9 The view embraced in this paper is that as the level of social security and company pensions is reduced, the demand for life annuities and phased withdrawals will increase. Policymakers need to recognize the shortcomings of current products, address the challenging regulatory issues of organizing robust and transparent annuity markets, and promote combinations of products and payout options.

⁸ James and Vittas (2000) list 10 reasons for the underdevelopment of voluntary annuity markets. Adverse selection is one of them and far from the most important. More recently, Babbel and Merrill (2006) also underscore the multiplicity of factors that have held back the growth of annuity markets.

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⁷ Hu and Scott (2007) address behavioral obstacles to the annuity market, drawing on recent advances in behavioral finance.

2. Pensioner Risks and Retirement Products

2.1 Pensioner Risks⁹

- 2.1 The main risk faced by pensioners is the risk of outliving their savings. This is often defined as longevity risk, although the two risks are not identical (see below). Depending on how their savings are invested, pensioners are exposed to investment and inflation risks as well as liquidity and bequest risks. Bankruptcy risk, which relates to the fate of the institution providing a particular product rather the product itself, is also an important risk that requires regulatory action to ensure that providers are financially sound.
- 2.2 Bankruptcy risk is present in all types of financial products, but is particularly important in the case of life annuities, which in principle are long-term contracts that are neither revocable nor portable. In recent years, it has become increasingly possible for fixed life annuities to be transferred among providers, magnifying the risk exposure of annuitants, who have no control over the transfer process. This places a clear responsibility on the regulatory authorities to adopt an effective and robust system of prudential regulation and supervision.
- 2.3 Except for the bequest risk and to a lesser extent liquidity risk¹⁰, all the other risks relate to the risk of pensioners outliving their savings. This is not identical to longevity risk because retirees may outlive their savings for several reasons even at a relatively young age. Their savings at the time of retirement may be too low, their rate of consumption in retirement may be too high, they may incur large medical costs, their savings may be exposed to a high investment risk, or they may be depleted by high inflation. Longevity risk is the risk of living longer than anticipated at the time of retirement. If this happens, even very large savings may be exhausted and prove inadequate. Linked to the risk of outliving their savings is the risk of a substantial decline in consumption and living standard since retirees experiencing a significant erosion of their savings will take action to cut their consumption spending to delay the moment of crisis when their savings are fully depleted.
- 2.4 Retiring workers also face annuitization risk, i.e., the risk that at the time of their retirement financial markets may be depressed, lowering the value of accumulated balances, especially those invested in equities and real estate, while long-term interest rates may be low, implying a high cost of fixed annuities.
- 2.5 An important characteristic of the risks faced by pensioners is that they often pull in opposite directions. Thus, the bequest risk works counter to the longevity risk and the risk of outliving one's savings. In a similar vein, the investment risk points in an opposite

⁹ This section draws on Chapter 3 of Rocha and Thorburn (2007).

¹⁰ The bequest motive becomes weaker as people reach advanced old age since children and even grandchildren will have reached maturity and independence by that time. Liquidity risk is present throughout a person's life and relates to the inability to use in an emergency a person's annuitized wealth.

direction in terms of desirable financial instruments to the liquidity risk. Bearing in mind these opposing implications, policymakers should adopt a cautious approach, favoring a reasonable level of annuitization but avoiding excessive annuitization.

2.2 Retirement Products

2.6 The main retirement products address the various risks faced by pensioners in different ways. They have their own risk characteristics and have advantages and disadvantages that shape their appeal to different groups of pensioners. The following table summarizes the risk characteristics of different products.

Table 1: Risk Characteristics of Retirement Products for Pensioners

	Pro	Protection Against		Provision of	
	Longevity	Investment	Inflation	Bequest	Liquidity
	Risk	Risk	Risk		
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
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

Note: Annuitization risk is present in all fixed and escalating annuities but does not affect variable annuities. Bankruptcy risk affects all types of retirement products but is particularly important in life annuities.

2.2.1 Fixed and Escalating Life Annuities

- 2.7 The common feature of fixed and escalating annuities is that their regular payments are either fixed in nominal or real terms or they grow at a predetermined rate of increase. They avoid the fluctuations in regular payments that characterize variable annuities.
- 2.8 Fixed real life annuities provide protection against longevity, investment and inflation risks. Their offer requires access to long-term inflation-linked securities. In the absence of such instruments, insurance companies charge an inflation risk premium that raises the cost of fixed real annuities.
- 2.9 Real annuities start with lower payments than nominal annuities but exceed nominal annuity payments in later years. For this reason, they appeal to people with longer life expectancies. This self-selection bias is taken into account by insurance companies in setting their premiums and explains further the higher load charged by them in offering these products.

- 2.10 Like all types of life annuities, fixed real annuities face liquidity and bankruptcy risks, but their main shortcoming is that they suffer from relatively low returns. In most advanced countries, inflation-protected bonds earn on average lower real rates of return than nominal bonds, equities or other real assets, although their returns suffer from lower volatility.
- 2.11 Fixed real annuities may earn a lower real rate of return than fixed nominal annuities for two reasons. First, real returns on inflation-linked bonds may be lower than those on nominal bonds because of the inflation protection that is provided to investors. The real return differential between nominal and real bonds can be seen as a premium for insuring against uncertain future inflation. Empirical evidence on this point is inconclusive, probably because the inflation risk premium on nominal bonds has been offset by the liquidity premium that has burdened the less liquid inflation-linked bonds. However, as the market for inflation-linked bonds becomes more liquid, the real return differential should favor nominal bonds.
- 2.12 A second reason for which fixed real annuities may be more expensive relates to the absence in most countries of inflation-linked corporate and mortgage bonds. In contrast, nominal annuities benefit from the ability of annuity providers to invest in corporate and mortgage bonds that offer higher returns than government bonds.
- 2.13 Fixed nominal annuities provide protection against longevity and investment risks but are exposed to inflation and liquidity risks as well as bankruptcy risk. Their exposure to inflation risk undermines their longevity protection since even a moderate rate of inflation causes significant erosion in the real value of annuity payments over a long period. Because early payments are relatively higher than payments from other types of annuities they are favored by people who have shorter life expectancies or tend to underestimate their longevity.
- 2.14 Escalating nominal annuities provide partial protection against inflation, depending on the rate of escalation (which is usually set at 3 or 5 percent) and the rate of inflation. If they increase at a rate that is higher than the rate of inflation they entail an increase in the real value of annuity payments and thus contribute to preserving the value of pensions relative to wages. However, escalating nominal annuities are exposed to inflation risk if the inflation rate is higher than the escalation rate. Escalating nominal annuities also start with lower initial payments and are exposed to a selection bias like real life annuities.
- 2.15 Escalating real annuities provide full protection against inflation and also allow for a gradual increase in the real value of pensions. Their main disadvantage is that early payments are further reduced compared to fixed real or nominal annuities and are therefore even less attractive to people with short life expectancies.

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¹¹ Chile is a notable exception in this respect (see below).

¹² An inflation rate of 3 percent per year would lower the real value of annuity payments by 26 percent over a 10 year period and by 45 percent over 20 years.

- 2.16 Annuities denominated in, or linked to, a reserve currency (either the US dollar or the euro) also provide some protection against inflation and are often recommended when there is a limited supply of domestic inflation-linked bonds. However, reserve currency annuities are fixed annuities that provide protection against runaway domestic inflation and domestic currency depreciation but not against global inflation. In addition, persistent deviations from purchasing power parity imply that for prolonged periods reserve currency annuities do not provide full protection even against domestic inflation. This is corrected when large devaluations take place.
- 2.17 All types of fixed and escalating annuities are exposed to annuitization risk, i.e., the risk of retiring and purchasing annuities at an inopportune time when financial markets are depressed and the cost of fixed annuities is high. They are also exposed to deceptive practices by selling agents who may not promote the products that offer the best prices and returns to annuitants. And they suffer from a wide dispersion of annuity prices.¹³

2.2.2 Variable Annuities

- 2.18 An important shortcoming of fixed and escalating, real or nominal, annuities is that they prevent pensioners from participating in the normally higher investment returns of equities and real assets. Thus, the protection against investment and inflation risks comes at a high cost.
- 2.19 Participation in equity and real asset returns is possible with variable annuities. These involve a risk-sharing arrangement with annuitants that covers both investment and longevity risks. ¹⁴ Because insurance companies do not bear the investment and longevity risks, they do not need to charge high upfront loads on such annuities. However, they need to adopt transparent and reliable methods of measuring investment performance and calculating the impact of longevity experience.
- 2.20 Another advantage of variable annuities is that their holders do not face annuitization risk. Since annuity payments are not fixed but vary with the investment performance of annuity assets, the conditions that prevail at the time of retirement do not have long-term implications.
- 2.21 Variable annuities can be profit-participating or unit-linked. The former may combine minimum guaranteed benefits with annual bonuses that target the preservation of the real value of annuity payments. In this way, they aim to provide some protection against inflation risk with some potential participation in high investment returns. In these products, which are also known as 'guarantee and bonus' annuities, annuity providers assume the longevity and investment risks up to the level of guaranteed benefits, but share these risks among participants for bonus-based benefits.

¹⁴ The advantages of risk sharing between providers and annuitants in terms of lower capital requirements and lower charges are discussed by Impavido et (2004).

¹³ The pricing and marketing challenges of all types of annuities are discussed in greater detail in section 4.2 below.

- 2.22 In 'guarantee and bonus' variable annuities, providers face the problem of bonus reversibility. To avoid declining bonuses, the first annuity payments are often based on conservative estimates of investment returns and defensive projections of longevity experience. Subsequent payments are adjusted to reflect realized results relative to initial projections. Under this approach, initial payments may be even lower than in fixed real annuities, giving rise to a selection bias that may be further heightened by the prevalence of more wealthy people among their users. This approach entails the creation of a large reserve to cover future bonuses. Unless special measures are taken, such as partially funding the bonus reserve with long-term debt, it may give rise to involuntary transfers from older to younger cohorts.
- 2.23 In unit-linked variable annuities, the investment risk is borne by individual pensioners and reflects the investment risk of the portfolios of their choice. But longevity risk is subject to risk-sharing arrangements either among all annuitants or among particular cohorts of annuitants. Unit-linked annuities are increasingly offered with some minimum guaranteed benefits, such that benefits may decline in a year when financial returns are negative but subject to a floor. The floor may be calculated on the basis of a zero real rate of interest, which would provide protection against inflation. This guarantee is offered at a price, which usually involves the application of a cap when financial returns are positive. Unit-linked annuities with minimum guaranteed benefits are very similar to 'guarantee and bonus' annuities. They have a comparative advantage over them in their greater transparency and objectivity but they are more difficult to price and require more complex reserving policies.
- 2.24 Variable annuities suffer from several shortcomings. Their holders are exposed to investment risk and to the nondiversifiable part of longevity risk. The offer of minimum guaranteed benefits mitigates the exposure of pensioners to these risks. But holders of variable annuities may also suffer from the effects of perverse marketing campaigns by annuity providers and from opportunistic profit distribution and transfer pricing policies (see below). The biggest challenge of variable annuities is the creation of a robust system of regulation and supervision to provide effective protection to annuitants.
- 2.25 Variable annuities, and especially unit-linked annuities that are heavily invested in equities, are often criticized for exposing pensioners to large investment losses and the risk of financial ruin. There is concern that in a large and prolonged decline of equity prices available balances may suffer significant depletion, undermining the provision of income security in old age. However, the historical mean reverting pattern of equity returns and the dollar-averaging process that is involved when retirement balances are accumulated over a long period act as mitigating factors to this possible adversity.¹⁵

accumulated capital would be higher at the end of a long period of high returns.

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¹⁵ Mean reversion implies that exposure to a prolonged decline in equity returns would be highest at the end of a prolonged period of high returns when accumulated balances would also be at their highest level. In contrast, accumulated balances would be at their lowest level at the end of a prolonged period of low returns but mean reversion would then imply a low exposure to low future returns over a prolonged period. Most analysts who highlight the exposure of variable annuities to the risk of early erosion because of a prolonged market downturn assume a fixed amount of capital and do not allow for the possibility that

- 2.26 Another criticism is that the large fluctuation in annuity payments from year to year may cause large changes in annual consumption patterns. However, pensioners do not have to consume all their annuity income when they receive it. They may well save some of their retirement income in years in which annuity payments are higher than average.
- 2.27 These criticisms also assume that available funds are invested in volatile financial instruments whereas pensioners may opt for more stable asset allocations and may also be protected by the offer of minimum guaranteed benefits. Nevertheless, since variable annuities have a larger exposure to equities than other types of retirement products and since mean reversion is subject to considerable deviations from its historical pattern, a more sanguine conclusion is to advocate partial use of variable annuities in combination with some other, less volatile and more predictable, types of retirement product.
- 2.28 The pooling of longevity risk also raises important policy issues. If only one pool covering all retirees is created, there will be unintended transfers from people of impaired health and short life expectancy to those of strong health and long life expectancy. This issue is complicated by the observed correlation between short life expectancy and low socioeconomic status. The problems created by socioeconomic differences in risk patterns are difficult to resolve, but people of impaired health can be placed in a special pool and encouraged to purchase fixed real or escalating nominal annuities or use phased withdrawals.

2.2.3 Other Types of Life Annuities

- 2.29 All types of life annuities suffer from lack of liquidity and flexibility and are exposed to bequest and bankruptcy risks. Joint life annuities and annuities with guaranteed periods of payment allow for limited bequests, protecting the dependants of annuitants in the event of early death. Annuities with guaranteed periods of payment entail very small decreases in monthly payments, at least for periods up to 10 years. This is because in the early years of retirement survival probabilities are very close to unity.
- 2.30 A useful contribution of joint life annuities is that they mitigate the distorting effects of adopting unisex mortality tables. The distortions emanate from the significant difference in the life expectancy of men and women. It is advisable that countries in which the use of unisex mortality tables is compulsory should also impose on both working spouses the requirement to use joint life annuities, thus limiting the tendency of annuity providers to target male retirees.
- 2.31 Traditionally, most countries did not mandate the use of joint life annuities. Countries with NDC systems do not require the use of joint life annuities in these pillars, although a reconsideration of this approach is under way in Sweden. Denmark and Sweden also do not impose any requirement for joint life annuities in their second pillars. Chile used to require married men to purchase joint life annuities but allowing working women the freedom to choose between single and joint annuities. This reflected the

traditionally lower labor force participation of women and their lower earnings. However, a recent change in the rules mandates the purchase of joint life annuities by both spouses.

- 2.32 The reversion rate, i.e., the pension benefit of the surviving spouse, should not be lower than 60 percent of the original pension. The reversion rate should be higher than 50 percent because of significant economies of scale in household living expenses. Some countries consider imposing a low reversion rate of 30 percent which would limit the financial protection provided to widows.
- 2.33 Countries that impose the compulsory use of unisex mortality tables should consider the adoption of a compensation mechanism to cope with its adverse effects on insurance company marketing and profitability. Under such a mechanism, companies with a disproportionate share of male annuitants would be required to make compensating transfers to companies with a disproportionate share of female annuitants. Such a mechanism is contemplated in Poland (Vittas et al 2010).
- 2.34 Deferred annuities, which start paying benefits a specified number of years after purchase, are an attractive option. They are less costly than immediate life annuities and could provide financial protection in old age when reliance on self-annuitization would be inadvisable. The cost of deferred life annuities depends on whether refunds are allowed in case of death before the expiration of the deferment period. Their cost is also affected by the greater uncertainty faced by insurance companies in projecting long-term longevity trends, especially as they impact the tail end of the age distribution. Deferred annuities can be combined with reliance on self-annuitization and phased withdrawals in the first years after retirement or with the use of fixed term annuities. Such combinations represent an attractive mix of retirement products, with the potential to achieve a better management of the different risks facing retiring workers.
- 2.35 At this juncture, it should be noted that joint life annuities with guaranteed periods of payment, which have proved very popular in Chile, are effectively combinations of term and deferred annuities, the former involving a series of certain dated payments during the guaranteed period and the latter starting to pay benefits at the end of the guaranteed period. Their wide popularity suggests that the operation of deferred annuities, which is advocated by a growing number of observers (Milevsky 2005, Antolin 2008), will not face insuperable problems. Offering deferred annuities will deprive annuity providers of the profits they would make on the term annuity part of traditional products. This will imply a need for adding a margin in their pricing and underwriting models but will not weaken the case for promoting deferred annuities to provide protection to pensioners in advanced old age.

¹⁶ The concept of 'delayed annuities' was recently introduced in the academic literature (Milevsky 2005, Webb et al 2007, Scott et al 2007). Although the potentially low cost of such annuities has been underscored, delayed annuities are no different from the traditional concept of deferred annuities. The cost advantage is substantially eroded if refunds are allowed in cases of early death, while such refunds may be necessary to enhance their attractiveness.

¹⁷ Hedging the investment risk is less of a problem.

- 2.36 Reverse mortgages are annuity products linked to the equity in owner-occupied houses. They provide regular income to pensioners in the form of interest-bearing loan advances that accumulate over time and are ultimately repaid from the proceeds of the sale of the mortgaged property. They have attractive features for pensioners who have a significant proportion of their wealth in owner-occupied housing and allow them to receive regular advances from their house without having to sell and move out. However, reverse mortgages are fraught with important regulatory issues, such as the need for a high level of transparency and integrity on the part of providers and adequate protection of owner- occupiers. They have experienced limited growth in countries such as Australia and the US. They also suffer from all the shortcomings of fixed life annuities.
- 2.37 Future innovations could develop new annuity products, offering more options to pensioners in coping with the various risks they face. Adjustable annuities would be an example of product innovation. They would allow annuity payments to be adjusted periodically (e.g., every 3, 5 or even 10 years) in line with the evolution of market interest rates and annuity prices. They would avoid excessive annuitization risk and would be attractive at times of low interest rates. Annuitants using such products would face a risk of future unanticipated declines in interest rates that would cause a reduction rather than an increase in annuity payments but this risk could be contained by applying appropriate and transparent caps on permissible adjustments. Adjustable annuities could also convert to fixed annuities after 5 or 10 years.
- Extendible annuities could be another innovation. They would combine in one product features of fixed and variable annuities but varying over time. In extendible annuities the schedule of payments over a ten-year period would be determined by using the prevailing nominal yield curve and cohort life tables with conservative estimates of future longevity improvements. The account of the annuitant would be debited with the present value of the projected actuarial payments over the first ten years of the annuity contract. The remaining balance would be invested in investment funds according to the asset allocation decision of each annuitant. Each year the predetermined payments would be extended for one more year and the account of the annuitant would be charged with the present value of payments for the additional year. If interest rates suffered a major decline, annuitants would have two main options: either maintain the level of annuity payments and transfer a proportionally larger capital sum to the annuity provider or accept an adjustment in the level of the annuity payments for the ensuing 10 years and transfer a proportionately smaller capital sum. They could also select a combination of the two options. If interest rates increased annuity payments could rise, but within prespecified prudent upper limits. Extendible annuities would have several advantages: they would make it easier for annuity providers to match fully the assets and liabilities of their annuity business; they would allow annuitants to benefit from the higher returns on equities and other real assets on part of their accumulated capital; and they would avoid the large fluctuations in annuity payments that may occur with variable annuities. Longevity risk would be shared among all users of these annuities. Like in the case of adjustable annuities, extendible annuities could also be converted into fixed or escalating, nominal or real, annuities.

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¹⁸ Adjustable annuities, resetting every 3 years, have been suggested by Blake and Hudson (2000).

2.2.4 Term Annuities and Phased Withdrawals

- 2.39 Term annuities consist of a series of payments made to their beneficiaries over a specified period of time. They are in fact quite similar to phased withdrawals but with a fixed term that may reach up to 25 years but normally runs for 5 or 10 years. They do not offer protection against longevity risk. Their treatment of investment and inflation risks depends on their features. They lack liquidity during their term but they allow for bequests and also permit a faster use of accumulated balances. They appeal to workers with impaired health and a short life expectancy.
- 2.40 Term annuities can be for fixed terms and fixed benefits calculated at the prevailing rate of interest or for fixed terms but variable benefits, with the latter consisting of "guaranteed" and "bonus" components. Term annuities are favored by pensioners who wish to have higher levels of income and spending during their early years of retirement relative to later years. The demand for term annuities is stronger when pensioners have access to universal healthcare services.¹⁹
- 2.41 Phased withdrawals consist of a series of fixed or variable payments whereby pensioners withdraw a fraction of their accumulated capital. They do not provide full protection against longevity risk, but by placing limits on annual withdrawals, they stretch balances over a longer period. Phased withdrawals allow for bequests but are exposed to investment and inflation risks. But unlike term and life annuities, they are portable and can be transferred to other financial institutions. Like term annuities, they appeal to workers with impaired health and a short life expectancy.
- 2.42 Phased withdrawals can be classified by the special rules covering the pace of withdrawals, including a fixed benefit rule and a fixed percentage benefit rule.²⁰ The most important type is the life expectancy phased withdrawal where the withdrawal fraction is each year set equal to the inverse of the remaining life expectancy of the account holder.
- 2.43 The account balance of phased withdrawals that follow the remaining life expectancy rule may increase initially if the rate of investment returns exceeds the withdrawal fraction. However, as pensioners grow old and their remaining life expectancy decreases, the withdrawal fraction is bound to surpass the rate of return and thus both the account balance and the annual benefit will start falling and will eventually become too small for long-lived individuals.
- 2.44 In Chile, prior to the 2008 changes, the monthly benefit from phased withdrawals could not fall below the MPG level. When the account balance was exhausted, the government assumed the payment responsibility. Thus, longevity risk was covered at the level of the MPG. After 2008, the MPG has been replaced by the PBS, which is now the

¹⁹ Term annuities, alongside life annuities from public schemes as well as from corporate plans, are popular in both Denmark and Sweden (Andersen and Skjodt 2007, Palmer 2008).

²⁰ This discussion draws on the classification of phased withdrawals presented in Dus et al (2003).

level at which longevity risk is covered. In addition, the monthly benefit is no longer calculated by using the average remaining life expectancy but instead at a higher life expectancy that limits the probability of workers outliving their savings to 5 percent.²¹

2.45 Because of their exposure to longevity, inflation and investment risks, total reliance on term annuities and phased withdrawals is not advisable. However, these products can play a part in combinations of retirement products, especially in countries with strong first pillars. They also have several advantages for people of impaired health, who end up subsidizing healthy people if they are forced to purchase life annuities from a single longevity pool.

2.2.5 Lump Sums and Self-Annuitization

- 2.46 Lump sums do not provide any protection against longevity risk, but allow for bequests. Their handling of investment, inflation and liquidity risks depends on how they are invested. A major advantage of lump sums is that they may be used to repay existing debt or even finance small business ventures. Their greater risk is that they may be wasted in frivolous consumption spending, causing an early depletion of available assets and increasing exposure to longevity risk.
- 2.47 Lump sums allow for reliance on self-annuitization whereby accumulated balances are invested in various types of investments, primarily combinations of mutual funds, and their holders are advised to withdraw a fixed percentage fraction each year from their accounts to cover their living expenses. There are many advantages to this approach, including greater liquidity and flexibility, the right of bequest, and participation in the higher returns of equities and other real assets. But there are also significant disadvantages.
- 2.48 This form of self-annuitization implies several attributes of investment savvy and foresight by average workers that are usually lacking. First, it assumes that retiring workers have the knowledge to manage their retirement accounts efficiently and are able to allocate wisely their balances between short-term money market instruments, long-term bonds, and real assets. It also assumes that workers have the wisdom to set their withdrawal fraction at a sufficiently low level to ensure that they would not outlive their savings. This requires an ability to estimate accurately their life expectancy and their needs in retirement. Self-annuitization also implies that workers have the strength to maintain a long-term commitment to whatever withdrawal rule they adopt. Self-annuitization may generate disastrous results if pensioners adopt either overly conservative investment policies (or, at the other extreme, overly aggressive ones), while at the same time breaching their withdrawal rule. In addition, self-annuitization is very difficult to manage in advanced old age when a fixed percentage rule would probably not be appropriate.²²

²¹ See Annex 1.

²² The high exposure to the probability of ruin in advanced old age is discussed in Milevsky and Robinson (2000).

2.3 Product Shortcomings and Policy Objectives

- 2.49 The fundamental objective of pension systems is not to accumulate retirement capital but to provide to pensioners a regular income that is sufficient to meet their retirement needs. Traditional defined-benefit social security systems and corporate pension schemes emphasized the offer of lifetime pensions to replace pre-retirement employment income. This contributed to a high level of annuitization of covered workers, especially those with long contribution histories.
- 2.50 Corporate pension schemes often allowed a partial lump sum commutation as a means of avoiding excessive annuitization. However, the replacement rate of preretirement employment income for those who were privileged to be covered by traditional defined-benefit schemes tended to be high.
- 2.51 Historically, targeted gross replacement rates from the integrated offer of social security and corporate pensions amounted to between 60 and 70 percent for workers with full contribution records. Allowing for the ceasing of pension contributions by workers after retirement, these translated into net replacement rates of between 75 and 90 percent.²³
- 2.52 The downsizing of social security systems and the growing adoption of defined-contribution plans in the private sector have shifted the decision on targeted replacement rates to individual workers. Restrictions on payout options encourage retiring workers to target a satisfactory replacement rate over the whole of their retirement life.
- 2.53 It is clear from the preceding analysis that all types of retirement products suffer from significant shortcomings. Fixed nominal annuities provide protection against longevity and investment risks but expose their buyers to inflation risk and prevent pensioners from participating in higher returns from equities and real estate.
- 2.54 Fixed real annuities protect against inflation as well as longevity and investment risks but lock their holders in low real rates of return. In countries where inflation-protected securities are not widely available, fixed real annuities also suffer from relatively high inflation risk premiums charged by insurance companies.
- 2.55 Although fixed nominal and real annuities provide protection against longevity risk, the protection often comes at a high risk premium, especially when insurance companies adopt conservative policies and allow for significant improvements in longevity.
- 2.56 It is often argued that insurance companies underestimate improvements in longevity. However, it is never clarified whether the alleged underestimation affects both their reserving and pricing policies. It may well be that insurance companies overestimate

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²³ A progressive income tax scale created an additional wedge between gross and net replacement rates.

longevity improvements in their pricing decisions but underestimate them in their reserving policies.²⁴

- 2.57 In addition, retiring workers purchasing fixed or escalating annuities face annuitization risk. This can be reduced by gradually increasing the share of long duration bonds in the investment portfolios of workers that are near retirement and/or gradually purchasing deferred annuities a few years before and after retirement.
- 2.58 Variable annuities, whether they are market-linked or bonus-based, avoid annuitization risk and are able to benefit from the higher long-term returns of equities and other real assets. However, they expose their holders to the investment risk associated with the high volatility of equity returns. In the case of bonus-based annuities, they depend not only on the investment performance of their providers but also on their integrity.
- 2.59 In general, annual bonuses on variable annuities reflect both investment performance and longevity experience. Thus, holders of variable annuities share in the longevity risk and are exposed to the financial impact of increasing longevity. This provides less protection than fixed annuities but the greater exposure to risk is mitigated by the slow and gradual impact of longevity improvements. In addition, the greater exposure is more apparent than real because insurers incorporate projected longevity improvements in their pricing of fixed annuities.
- 2.60 Unless they take the form of joint life annuities with guaranteed periods of payment, all types of life annuities suffer from significant bequest risk. It is for this reason that joint life annuities with guaranteed periods of payment are highly recommended. These types of products mitigate the adverse impact of unisex mortality tables and are therefore particularly attractive in countries that compel their use. Compensating transfers to annuity providers with a disproportionate share of female annuities may also be used.
- 2.61 All types of life annuities suffer from lack of liquidity and flexibility. This can be addressed by using a combination of retirement products.
- 2.62 Phased withdrawals and term annuities also have shortcomings, especially the failure to protect against longevity risk. Depending on the withdrawal rule and investment performance, the holders of phased withdrawals run either a high risk of balance exhaustion and outliving their savings (e.g., if an imprudent fixed benefit or fixed percentage benefit rule is retained) or a high risk of a significant decline in the level of the withdrawn amounts (e.g., in cases where the withdrawal rule is based on the remaining life expectancy).

²⁴ Reserving policies of insurance companies and pension funds are notoriously subjective. Profitable entities tend to use low discount rates to overstate their liabilities and over-reserve in order to reduce their reported profits and pay lower taxes; entities facing financial difficulties tend to use high discount rates to understate their liabilities and under-reserve in order to conceal their financial weakness. The same subjective approach may be applied with regard to longevity risk.

- 2.63 Given all these shortcomings, it is not surprising that in countries where there are no restrictions on payout options, retiring workers and financial planners show a preference for a policy of self-annuitization with some form of fixed withdrawal rule. Self-annuitization confers greater liquidity and flexibility, the right of bequest, and participation in the higher returns of equities and other real assets.
- 2.64 However, it also implies possession of financial management savvy by ordinary workers and ability to maintain strong long-term commitments in the face of potentially growing financial pressures. Self-annuitization is very difficult to manage in advanced old age and is thus unsuitable as the sole product to be used throughout a person's life in retirement.
- 2.65 Complete reliance on self-annuitization is incompatible with a mandatory pension pillar. Imposition of compulsory saving for retirement is predicated on the argument that workers fail to make adequate provision for their retirement needs. It is then difficult to argue that retiring workers able to make accurate estimates of their life expectancy and their needs in retirement, and should not therefore be constrained in their payout options.
- 2.66 If self-annuitization cannot provide the answer of how to organize the payout phase, while all retirement products suffer from significant shortcomings, the conclusion that emerges is that the payout phase should be based on a combination of options, in which lump sums and self-annuitization can play a part, but one which also promotes use of some types of life annuities and phased withdrawals.
- 2.67 This implies a judicious use of restrictions on payout options, imposing some minimum level of annuitization to protect retired workers against longevity, investment and inflation risks but allowing for the possibility of benefiting from higher equity and real asset returns as well as for greater flexibility and liquidity. The various policy options are reviewed in section 4.1 below, after a discussion of risks faced by providers of retirement products and by governments.
- 2.68 At this juncture it is important to emphasize that countries that do not mandate the use of a single retirement product by all but offer a constrained choice to retiring workers also need to specify the product that will be used as the default option. The lack of financial savvy by most workers and the considerable complexity of most retirement products implies a strong need for guidance and impartial advice. Specifying the default option will help workers who find it difficult to deal effectively with complex financial decisions.

3. Risks of Retirement Products for Providers and Governments

3.1 This section discusses the risks faced by providers of retirement products and by governments in offering a safety net in retirement. We first review the main types of provider risks and follow with a discussion of policies to cope with these risks and then discuss the risks faced by governments.

3.1 Main Types of Provider Risks

- 3.2 The main types of risks faced by providers of retirement products, e.g., investment, inflation and longevity risks, are similar but inverse to those faced by pensioners. Other risks faced by insurance companies and pension funds include underwriting, credit or counterparty, liquidity and operational risks.²⁵
- 3.3 Discussing them in reverse order, operational risk is the risk of losses resulting from administrative failure or fraud caused by inadequate internal controls. Life insurance companies and pension funds are subject to operational risk like any other type of financial institution. Their vulnerability may be greater because of the long-term nature of some of the products they offer. Failure to maintain effective internal controls may lead to improper portfolio decisions, or transactions involving conflicts of interest, and may ultimately result in low returns or losses as well as fines or other impositions by the supervisor. Providers may also suffer from larger costs than necessary due to the use of outdated technology and greater exposure to losses arising from fraud committed by clients as well as staff.
- 3.4 Liquidity risk is the risk of losses resulting from insufficient liquid assets for the cashflow requirements associated with underwritten policies. Providers of retirement products are generally less exposed to liquidity risk. Their cash outflows are easily predictable since they are not exposed to a sudden large increase in claims or to early and voluntary termination of contracts. Nevertheless, they still require accurate forecasts of future cash outlays and need to build an asset portfolio capable of generating the necessary liquidity.
- 3.5 Credit or counterparty risk is the risk of losses arising from the deterioration of the credit quality of issuers of instruments and counterparties, especially the risk of default. This risk is most visible in the case of instruments, such as corporate bonds, that may suffer a downgrading of credit rating. But it is also present in reinsurance arrangements and derivative agreements. It is of major importance in the case of long-term interest rate swaps.²⁶
- 3.6 Providers of retirement products may also face credit risk in their arrangements with agents and brokers with regard to premiums receivable. Other types of counterparty risks include settlement risk (arising from time lags between the trading and settlement dates of securities transactions), documentation and custody risk (arising from failures in the legal documentation or custody of instruments in the portfolio), and concentration risk (arising from excessive concentration of investments in an individual entity, a sector or a geographical area).

²⁵ This section draws on Chapters 3 and 4 of Rocha and Thorburn (2007).

²⁶ Long-term interest rate swaps are playing an increasing part in hedging the long-term liabilities of insurance companies and pension funds. These tend to be over-the-counter customized instruments. Management of counterparty risk is a crucial aspect of the successful use of these instruments.

- 3.7 Underwriting risk is the risk of mis-pricing annuities due to improper assumptions about future mortality rates, investment returns, and operating costs. In the case of fixed life annuities, one of the major sources of underwriting risk is longevity risk, or the risk that the annuitant will live longer than anticipated when the contract is underwritten. This may arise due to a variety of factors, including insufficient or poor mortality data, difficulties in assessing future improvements in longevity (due, for example, to unanticipated medical advances and lifestyle improvements), the greater uncertainty of the tail-end of the age distribution, or failure to differentiate annuitants according to their level of risk.
- 3.8 Annuity contracts may also be mis-priced due to unrealistic assumptions about future reinvestment rates or about the company's capacity to manage its operating costs (e.g., overestimating the effect of improvements in technological advances or the impact of gains in market share and increased economies of scale). Underwriting risk is often increased by the intensity of competition in decentralized markets, the incurrence of unduly high marketing costs, and the adoption of aggressive selling campaigns.
- 3.9 Investment risk relates to losses arising from the volatility of asset and liability prices, which are affected by changes in interest rates, exchange rates, equity prices and property values. It reflects the extent of mismatching between assets and liabilities. Providers who offer life annuities usually suffer from mismatched positions. Typically, the duration of assets is substantially shorter than the duration of liabilities. Their risk then becomes reinvestment risk and relates to the risk that the returns on the funds to be reinvested will fall below anticipated levels.
- 3.10 Investment risk is increased by exposure to pre-payment risk, which is the risk that issuers of debt instruments use their right to pay their obligations before the contracted maturity. This risk is present in the case of mortgage bonds or mortgage-backed securities, where the underlying mortgages have refinancing options, or in the case of callable corporate bonds.
- 3.11 Investment risk can be subdivided into interest rate, equity, currency and inflation risks. Interest rate risk results from fluctuations in the general level as well as the term structure of interest rates. The exposure to this risk is greater the larger the mismatch between the duration of assets and liabilities. This is one of the most important risks faced by providers of fixed life annuities, as they tend to invest heavily in fixed interest assets but are unable to maintain completely matched positions.
- 3.12 Equity risk arises from the exposure to fluctuations in equity prices and is greater the larger the mismatch between the size of the equity portfolio and the size of annuity contracts linked to equity prices. Likewise, currency risk occurs when the provider issues annuities denominated in one currency but holds assets denominated in another currency. Inflation risk is faced by the providers of retirement products when they issue life or term annuities indexed to prices but do not hold sufficient inflation-indexed financial instruments.

3.2 Coping with Provider Risks

- 3.13 Coping with operational, liquidity and credit risks depends on the internal risk management systems of individual institutions. Thus, dealing with operational risks requires the creation of effective internal controls that emphasize deterrence and early detection of fraud and administrative failures. Regulators play an important role by requiring providers to develop risk mitigation and control policies and to ensure segregation of duties and avoidance of conflicts of interest in assigning managerial responsibilities.
- 3.14 To manage liquidity risk providers need to maintain an adequate cushion of liquid assets and to take into account the level of liquidity of marketable financial instruments. Access to money market instruments and derivative products enhances the efficiency of liquidity management. On the other hand, imprudent reliance on short-term money market instruments for funding purposes magnifies the risk exposure of individual institutions.
- 3.15 Management of credit risk entails careful consideration of the risk of deterioration of the credit quality and default of different issuers and close monitoring of exposure to risk concentrations. Regulators promote the sound management of credit risk by imposing limits on exposure to low grade investments and to risk concentrations.
- 3.16 Use of credit derivatives facilitates the efficient hedging of credit risks although it raises the issue of the quality of counterparty risk, which is particularly important in the case of derivative instruments and reinsurance arrangements. However, all these risks are no different from similar risks faced by all types of financial institutions and require the development of efficient and effective internal risk management systems supported by sound systems of prudential regulation.
- 3.17 Dealing effectively with underwriting risk is a complex undertaking and requires the development of sophisticated models that allow for future medical advances in lowering mortality, the likely future evolution of investment returns, and the likely future evolution of operating costs. The projection of future investment returns must allow for the possible impact of credit and prepayment risks, while the projection of operating costs must take into account improvements in efficiency and the impact of achieving a larger scale of operations. However, underwriting risk is often increased as a result of aggressive pricing and marketing campaigns that may result in thin financial margins. Close monitoring of underwriting results is required by product and cohort.
- 3.18 Depending on the types of products offered by providers, underwriting risk may encompass longevity, investment and inflation risks. There is no underwriting risk in lump sum withdrawals, phased withdrawals and unit-linked annuities because in these products providers do not assume any longevity, investment and inflation risks. In contrast, fixed real life annuities expose providers to all three of these risks. Other products, such as fixed nominal life annuities, traditional profit-participating life annuities with minimum guaranteed benefits and term annuities, create exposure to some

of these risks. The pattern of risk exposure of providers of retirement products is the reverse to that of pensioners (Table 2).

- 3.19 Coping with investment and inflation risks requires the adoption of sophisticated asset/liability management techniques. These emphasize the maintenance of matched positions between assets and liabilities, the use of derivative products for portfolio immunization, and the provision of capital backing to absorb financial losses from mismatched positions and adverse movements in market prices.
- 3.20 Close monitoring of the risk exposure of insurance companies and pension funds is essential. Regulators can play an important role by requiring the use of regular stress testing to measure the impact of adverse developments on the financial soundness of individual institutions. However, stress testing exercises still continue to be formulated in rather static terms, while the 2008 global financial crisis and the huge losses suffered by major financial institutions in sub-prime mortgages and credit default swaps underscore the unsatisfactory state of risk management in even the largest and most sophisticated financial institutions.

Table 2: Risk Characteristics of Retirement Products for Providers

	Exposure to			
	Longevity	Investment	Inflation	
	Risk	Risk	Risk	
Fixed Real Life Annuities	Yes	Yes	Yes	
Fixed Nominal Life Annuities	Yes	Yes	No	
Escalating Real Life Annuities	Yes	Yes	Yes Plus	
Escalating Nominal Life Annuities	Yes	Yes	Partial	
Variable Life Annuities: Guaranteed Benefits	Yes	Yes	Possible	
Variable Life Annuities: Bonus Payments	No	No	No	
Variable Life Annuities: Unit-Linked	No	No	No	
Lifetime Phased Withdrawals	No	No	Possible	
Term Annuities	No	Possible	Possible	
Lump Sums	No	Possible	Possible	
Self-annuitization	No	Possible	Possible	

- 3.21 Maintaining fully matched positions between assets and liabilities minimizes exposure to investment and inflation risks. However, there are three major problems with this approach. First, it is not totally feasible because in most countries there is not an adequate supply of fixed-term, fixed-rate instruments to match the potential demand from fixed-rate life annuities, the liabilities of which can span 40 years or longer. Second, the policy is expensive in terms of the relatively low returns that are available on risk-free government bonds. This is especially the case with inflation-protected government bonds.
- 3.22 Third, the liabilities of providers of life annuities can only be ascertained in actuarial terms on the basis of projections of future longevity. This prevents a complete matching of assets and liabilities, although the mismatching that may materialize from underestimating (or overestimating) future longevity and thus understating (or overstating) the true duration of liabilities is not usually so large as to invalidate the benefits of asset/liability management techniques. However, having access to long-term

fixed-rate debt instruments and, in the case of fixed real annuities, to long-term inflation-indexed instruments is of paramount importance.

- 3.23 To enhance investment returns and thus offer better terms on their annuity products, insurance companies invest in corporate and mortgage bonds that offer higher yields, although they are exposed to credit risk and often prepayment risk. This exposure needs to be closely monitored and to be taken into account in determining the capital requirement of providers of retirement products.
- 3.24 Prepayment risk can be effectively managed by access to interest rate options, bond futures, swaptions, and callable debt, but most of these instruments are not usually available in developing countries. The lack of hedging facilities suggests a moderate use of callable debt instruments despite their higher yields.
- 3.25 Extensive use of corporate and mortgage bonds raises the question of the appropriate rate of interest for calculating the value of annuity contracts. If there is a government guarantee of annuity payments in cases of provider insolvency, the correct rate to use is the yield curve on risk-free government bonds for the guaranteed amounts and the corporate and mortgage bond yield curves for amounts in excess of the guarantees. Use of risk-free rates when providers of annuities invest heavily in corporate and mortgage bonds overstates the value of annuities by a significant factor.
- 3.26 Recent years have seen the growing use of long-term interest rate swaps and swaptions in some advanced countries for hedging the liabilities of life annuities. This is a promising approach, although it raises important questions about the credit quality and adequate availability of trustworthy counterparties. The widespread use of customized over-the-counter products rather than standardized exchange-traded contracts enhances the flexibility and efficiency of these hedging facilities, but increases exposure to the creditworthiness of counterparties which may be difficult to ensure over the very long duration of these contracts.
- 3.27 Dealing with longevity risk requires reliable projections of the expected future survivorship of annuitants, taking into account various personal characteristics as well as expected health improvements. Estimating future improvements in longevity is one of the most challenging tasks faced by annuity providers due to the sharp advances in medical technology and the stricter health standards that have been introduced. Faced with these difficulties, annuity providers use conservative assumptions about future improvements in longevity and tend to apply higher margins on younger annuitants and on deferred annuities.
- 3.28 Adverse regulations may also complicate the management of longevity risk. For instance, insurers may be required to use outdated mortality tables, which would be particularly detrimental in annuity pricing but would also cause problems for reserving policies. The use of outdated mortality tables is more prevalent in developing countries because of the lack of comprehensive local data and extensive reliance on mortality data from foreign countries. The compulsory use of unisex life tables, which is imposed in EU

countries, also complicates the management of longevity risk, although the impact of unisex tables is mitigated by the widespread use of joint-life annuities.

- 3.29 Longevity risk, especially the more uncertain tail end of the age distribution, may be addressed by the use of reinsurance with global reinsurers. However, regulatory restrictions, such as a requirement for the localization of insurance assets, discourage foreign reinsurers from participating in the local market and hinder access to global reinsurance. Other possibilities include the use of longevity bonds and longevity derivatives. The supply and pricing of these instruments are at an early stage of development and their use has yet to take hold even in the most advanced countries.
- 3.30 Another solution that is used extensively in some countries is the sharing of the longevity risk with annuitants. This can happen either with unit-linked annuities or with traditional profit-participating 'guarantee and bonus' annuities. In the latter case, insurers assume the investment and longevity risks up to the level of guaranteed benefits but share these risks among annuitants beyond that level. Effectively, improvements in longevity as well as changes in investment returns are reflected in annual bonuses. Risk-sharing arrangements have many potential advantages but require a high level of transparency and integrity on the part of annuity providers and a robust and effective system of regulation and supervision.

3.3 Risks Faced by Governments

- 3.31 Governments face three main risks in providing a safety net in retirement. The first emanates from the provision of public pillar benefits. The second is linked to the offer of government guarantees on accumulated balances in retirement savings accounts. The third stems from the offer of government guarantees of annuity payments in case of provider insolvency.
- 3.32 Public pillar benefits may be financed from general tax revenues or from unfunded (or partially funded) contributory pillars. The first type of benefits may involve universal pension benefits that are likely to be subject to clawback provisions or the offer of minimum pension guarantees that ensure that benefits from the first or second pillars do not fall below specified minimum levels. In both cases, policymakers must avoid adopting rules that distort incentives and encourage workers to rely on public benefits for their income security in retirement. This requires careful stipulation of clawback provisions in the case of universal benefits and careful stipulation of conditions of retirement and access to government support in the case of minimum public pensions.
- 3.33 Benefits from unfunded (or partially funded) contributory pillars may increase pressures on government budgets as a result of deteriorating system dependency ratios when the number of beneficiaries rises much faster than the number of contributors. Changes in the rules of these pillars may be adopted to contain their cost and reduce their budgetary impact.

- 3.34 The second risk is linked to the performance of accumulated assets on retirement savings accounts and the considerable annuitization risk to which workers are exposed at the time of their retirement. The 2008 global financial crisis has underscored the high financial risk faced by retiring workers, especially if they have a heavy exposure to equities and other assets with volatile prices. In addressing this risk, governments may promote the use of lifecycle funds, which increase their allocations into long-term bonds as workers approach retirement. They may combine the use of lifecycle funds with the offer of a government undertaking to raise accumulated balances to the level that would reflect a specified minimum lifetime real rate of return (this rate could range between zero and two percent).
- 3.35 The other major risk is the risk of large expenditures associated with the failure of providers of annuity products to meet their obligations. Governments provide guarantees to annuitants that they will assume the responsibility for annuity payments if a provider becomes insolvent. The terms of the guarantees need to be carefully formulated to lower the risk of moral hazard, involve an element of co-insurance and apply risk-based premiums for the guarantee. The government risk may increase if providers adopt aggressive pricing policies and pursue imprudent investment policies. The presence of the government guarantee may weaken market discipline. Governments need to impose sound capital and reserve regulations and implement effective risk-based supervision to reduce the risk of provider insolvency. Developing well-designed and speedy resolution mechanisms helps contain the cost of the government guarantees.

4. Policy Options

- 4.1 The preceding discussion has shown that organizing the market for retirement products and ensuring an adequate level of income for retired workers and their families confront policymakers with major challenges, even in countries with well-developed financial and insurance markets. The challenges are far greater in developing countries where financial and insurance markets are less well established.
- 4.2 In this section, we discuss the policy options faced by policy makers in developing countries. We first address the regulation of payout options in the context of a desired level of annuitization to ensure not only that pensioners do not suffer from abject poverty in old age but also that they maintain a reasonable standard of living in retirement compared to their pre-retirement levels of consumption. We then discuss the regulation of providers of retirement products, focusing on the overall organization of the market, the regulation of pricing and marketing policies and, last but by no means least, the prudential regulation of providers of retirement products in conjunction with the types of risk assumed by them. In this section we draw on the lessons suggested by the experience of the five countries covered in this project.

4.1 The Regulation of Payout Options

4.3 The first policy issue confronted by policymakers in designing the payout phase of pension systems is whether, and at what level, to make annuitization compulsory by

mandating the use of life annuities. Additional issues concern the types of annuities that should be mandated: Should annuities cover single or joint lives? Should they be fixed in real or nominal terms? Should variable annuities be allowed?

- 4.4 In answering these questions, policymakers need to bear in mind the two main points that have emerged from the discussion of pensioner risks and the shortcomings of different annuity products. The first is that while there is a need to ensure that retiring workers opt for an adequate level of annuitization, care must be taken to avoid forcing an excessive level of annuitization. The second is that because of the serious shortcomings of all types of retirement products, a combination of payout options should ideally be favored, covering different products as well as different payout options over time.
- 4.5 Policy decisions are bound to be country specific and should take into account prevailing conditions in each country, specifically the presence and relative importance of public pensions and the public provision of healthcare. Two limiting cases can be identified: countries where public pensions continue to play a significant part in the overall system; and countries in which public pensions have been eliminated or substantially curtailed and a mandatory second pillar based on individual capitalization accounts is expected to play a major role in the provision of retirement incomes.
- 4.6 The Chilean approach would seem appropriate for the second group of countries. It has entailed tight restrictions on lump-sum distributions and a requirement to use either fixed real annuities or life expectancy phased withdrawals. The use of joint life annuities has been imposed on married persons, while the joint life expectancy for married couples has been used for determining annual payments under phased withdrawals. The use of life annuities with guaranteed periods of payment has been permitted. These have proven popular as they have addressed the bequest motive of pensioners.
- 4.7 The Chilean approach has implied compulsory annuitization at the level of the minimum pension guarantee (MPG) (or the basic solidarity pension (PBS) after the 2008 reform) since monthly payments to holders of phased withdrawals are not allowed to fall below this level. When account balances are exhausted, the government assumes the payment obligation.
- 4.8 The conditions for lump-sum withdrawals and early retirement have been tightened over time. Before 2004 workers were allowed to retire early and withdraw any excess balances in a lump sum provided they could purchase a fixed real life annuity that was equal to 110 percent of the MPG and 50 percent of their average real earnings over the preceding ten years. In 2004, these limits were raised to 150 and 70 percent respectively, while months with no contributions were excluded from the calculation of the 10-year average.²⁷ Another rule change in 2004 allowed annuitizing workers to use a combination of a fixed real annuity at the MPG level with either a phased withdrawal or a

²⁷ The tightening of retirement conditions and increase in the targeted replacement rate have been justified by the need to counter the large rise in early retirement and the need to prevent a large future increase in spending on pension supplements. Other important factors have been the absence of a front-loaded public pension and the need to ensure adequate income in retirement.

variable annuity.²⁸ The 2008 changes in the rules replaced the 150 percent MPG ratio with another ratio that is equal to 80 percent of the PMAS, the maximum private pension for which a pension solidarity supplement is provided (see Annex 1 for more details). It suffices to note here that the new rule is more stringent.

- 4.9 Placing restrictions on lump-sum withdrawals is essential for countries that do not have a significant provision of public benefits. The use of life annuities or life expectancy phased withdrawals would prevent an early exhaustion of balances and avoid poverty in old age. However, insisting on using fixed real annuities would not be advisable in the absence of an adequate supply of inflation-indexed financial instruments. In addition, fixed real annuities may prove unduly expensive if real returns on inflation-protected bonds are low. Since fixed nominal annuities do not provide a good protection against inflation, an attractive alternative would be escalating nominal annuities, rising at 3 or 5 percent per year.
- 4.10 Countries could also consider a combination of a minimum level fixed real annuity (such as the MPG/PBS in Chile)²⁹ and a life expectancy phased withdrawal. This approach would allow flexibility and participation in the higher returns of equity investments without imposing a heavy burden on the regulatory framework. In contrast, the offer of variable annuities, whether traditional profit participating 'guarantee and bonus' annuities or unit-linked annuities, would require a major strengthening of regulation and supervision and a very high level of transparency and integrity of annuity providers.
- 4.11 The offer of variable annuities would require adoption of clear and detailed rules on the initial calculation of annuity payments and their annual adjustment in the light of net investment performance, reflecting investment returns on the underlying asset portfolios, the impact of longevity experience, and the evolution of operating costs. The rules would also need to specify the treatment of any minimum guaranteed benefits in the context of the prudential regulation of annuity providers and the reserves they will be required to maintain to support different types of retirement products. Variable annuities should not be considered until the insurance markets are well developed and the regulatory and supervisory framework become sufficiently robust and effective.
- 4.12 Countries where public pensions continue to play a significant part in the overall system could organize the public provision in the form of either a universal pension financed from general revenues or a public pension from a contributory scheme in a traditional social security context. The public pension could equal between 25 and 30 percent of economy-wide average earnings for single pensioners and between 40 and 50 percent for married couples. In countries with equal pension rights for men and women, a universal or public contributory pension of between 25 and 30 percent of economy-wide average earnings per person and irrespective of marital status could be adopted.

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²⁸ As already noted above, the pension reform of 2008 effectively replaced the MPG with the PBS (Pension Basica Solidaria).

²⁹ Or a minimum escalating nominal annuity if inflation-indexed financial instruments are not in adequate supply.

- 4.13 The public pension is usually linked to the growth of average earnings and thus provides protection against inflation as well as participation in future income growth. The normal retirement age at which the public pension is payable is adjusted periodically on an ad hoc basis in most countries.
- 4.14 Normal retirement age could be linked to life expectancy at retirement, based on a rule that would aim at maintaining a constant ratio between retirement life and active working life (passivity ratio). A passivity ratio of 0.5 would imply that for every one-year increase in life expectancy at a given normal retirement age, retirement age would increase by 8 months. Adjustments in retirement age could take place on a triennial basis and could take into account reasonable estimates of expected improvements in longevity.
- 4.15 Many high-income countries have endogenized the retirement decision by applying appropriate actuarial decrements for early retirement and increments for late retirement, five years before or after the normal retirement age, or by operating a notional (or nonfinancial) defined contribution (NDC) system where workers accumulate notional balances on their retirement accounts, which they use to purchase life annuities at retirement.
- 4.16 The government enjoys major advantages in offering indexed benefits to pensioners. It benefits from scale economies and is better able to handle both longevity and inflation risks. The public pension represents a floor of retirement income and ensures that old people are not unduly exposed to longevity, investment and inflation risks.
- 4.17 To contain the cost of public pensions, effective clawback provisions are applied by some countries to people earning close to or significantly above average earnings.³⁰ On the other hand, disability pensions and supplements are payable to workers who are unable to work or have no other sources of income. Because public pensions represent a relatively low replacement rate of own earnings for workers earning close to or above average earnings this approach leaves considerable scope for private provision and supplementary types of retirement income.
- 4.18 Countries with large public benefits may adopt a more liberal approach to the regulation of payout options. The presence of public benefits payable for life mitigates the exposure of workers to investment and longevity risks. Fewer restrictions need to be imposed on lump sum withdrawals, while term annuities and phased withdrawals for fixed terms may also be permitted.

³⁰ Australia and Denmark apply clawback provisions on their universal pensions. In Australia, use is made of both an income and an asset test. The income test reduces pensions from the zero pillar at a rate of 40 percent of the excess over a threshold level that for single pensioners amounts to about 6 percent of the average wage and for couples to about 11 percent. The Danish universal pension is subject to a clawback of 30 percent of the excess over a specified threshold level of income. The threshold is set by government decision and amounts to the relatively high level of around 75 percent of average earnings.

- 4.19 In Denmark and Sweden there is strong demand for term annuities of 5 and 10 years to supplement income during the first decade of retirement. The use of clawback provisions in Denmark implies that public benefits are lowered or even eliminated while pensioners receive income from term annuities but the public benefits are restored once payments from term annuities are terminated.
- 4.20 In countries with large public benefits, variable annuities may also be authorized without a requirement for a minimum fixed annuity from accumulated balances in individual accounts since this need is satisfied by the provision of life annuities from the public pillars. However, as already noted, the authorization of variable annuities should be conditional on the presence of robust regulation and effective supervision of insurance markets.
- 4.21 A key policy decision concerns the regulation of lump-sum withdrawals. Historically, universal benefits and social security pensions have been paid as life annuities, often linked to price or even wage inflation but with no allowance for lump-sum distributions. This restriction has emanated from the basic objective of public pensions to provide income security in old age.
- 4.22 In contrast, defined-benefit occupational pension plans have allowed for partial lump-sum commutations. These have been motivated by the need to avoid excessive annuitization and provide for flexibility, liquidity and bequests. They have been shaped by the limits allowed by tax rules on the exemption status of lump sums and have usually allowed lump-sum commutations of between 25 and 33 percent of the present value of future benefits.
- 4.23 In defined-contribution plans, government or plan restrictions on lump-sum withdrawals favor the use of life annuities or phased withdrawals. In Chile, lump sums are allowed only if a fixed real life annuity is purchased that achieves a specified targeted replacement rate. This equaled 50 percent of the average real earnings of retiring workers over the preceding ten years but was raised to 70 percent in 2004.³¹ This approach would be appropriate for all countries that do not operate universal or social security pensions.
- 4.24 Countries where public pensions from the zero and/or first pillars have a significant presence could adopt a targeted integrated replacement rate, permitting lump-sum withdrawals if the combined replacement rate from the zero, first and second pillars exceeds a specified level. This could vary between 50 and 70 percent of a worker's average real earnings over the preceding ten years. Thus, if public benefits represent 30 percent of the reference earnings of a worker, the annuity from the second pillar would need to amount to between 20 and 40 percent, depending on the adopted target.

³¹ It should be noted that depending on the rate of wage growth, the new requirement equals between 64 percent of the final wage with a 2 percent wage growth and 59 percent with a 4 percent wage growth. There is also a requirement relating indirectly to average wages but this is less demanding than the 70 percent rule (see Annex 1).

- 4.25 Countries that favor the development of voluntary savings may adopt somewhat lower targets. In fact, these integrated replacement rates may be seen as regulatory thresholds that will determine the level of excess balances that can be withdrawn as lump sums rather than desirable targets. Their main role is to ensure an adequate level of income over the whole of a person's retirement, while avoiding excessive annuitization.
- 4.26 An alternative approach for such countries would be to mandate the offer of a minimum lump-sum option of between 25 and 33 percent of the value of accumulated balances, a rule that has been implemented in Switzerland and has aimed at lowering the risk of excessive annuitization. However, imposing no upper limits on lump-sum withdrawals, as is currently the case in Australia and Switzerland, is not consistent with the operation of a mandatory retirement saving pillar since it exposes retiring workers, who opt for complete lump sum withdrawals, to the risk of early depletion of their accumulated savings and a significant decline in living standards in advanced old age.
- 4.27 Another policy decision concerns the treatment of annuitization risk. Two simple solutions that can be implemented even in countries with less developed insurance markets are a gradual increase in the share of long duration bonds in the investment portfolios of workers that are near retirement and/or a gradual purchase of deferred annuities a few years before and after retirement. In countries with more sophisticated insurance markets, the use of adjustable and extendible annuities could be promoted.³²
- 4.28 Annuitization risk can also be addressed by regulating the annuity conversion factor as has been applied in Switzerland. However, this approach raises many issues of sustainability, efficiency and even fairness. It would not be recommended unless a model could be developed that would be able to achieve a smooth cyclical and secular adjustment³³ in the annuity conversion factor without political interference and without undermining the long-term solvency of annuity providers.
- 4.29 A further issue that policymakers need to address is the prevailing wide dispersion of annuity prices in decentralized, competitive markets. Fixing the annuity conversion factor across all providers avoids this problem but is faced with the difficulties and objections discussed in the preceding paragraph. Centralizing the offer of annuities in a monopoly provider also avoids this problem. Centralized provision enjoys some important advantages in terms of scale economies and risk pooling but also suffers from potential disadvantages in terms of operational inefficiency and exposure to political interference. In decentralized competitive markets, the main policy option is to take measures to improve the marketing of annuities. Creating a centralized electronic quotation system merits consideration since it lowers the search costs of retiring workers, minimizes the influence of brokers, and promotes greater transparency and competition.
- 4.30 A final policy issue concerns the use of different payout options over time. A particularly attractive concept is the use of deferred annuities that are purchased at the

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³² The main features of these products are reviewed in section 2.2.3 above.

³³ Cyclical to reflect fluctuations in interest rates over the business cycle and secular to reflect long-term improvements in longevity.

time of retirement and become payable 10, 15 or 20 years later in conjunction with the use of phased withdrawals, or term annuities, or even reliance on self-annuitization during the deferment period.³⁴ Of course, deferred annuities would need to be real annuities to protect old age pensioners from the vagaries of inflation.

- 4.31 The rules could allow for deferred annuities with refunds in case of death during the deferment period as well as without any such refunds. Clearly, deferred annuities without refunds would be significantly cheaper and would allow a larger part of accumulated balances to be used as lump sums in a self-annuitization approach or for defining monthly payments under phased withdrawals and term annuities.
- 4.32 The combined use of self-annuitization and deferred annuities would alleviate the burden of financial management in advanced old age and would significantly reduce the risk of financial ruin that sole reliance on self-annuitization would entail. However, deferred annuities suffer from the greater difficulty in projecting long-term longevity trends and calculating their effects on the tail end of the age distribution. And since they should ideally take the form of deferred fixed real annuities they need to have access to long-term inflation-linked instruments

4.2 Financial Literacy and Default Options

- 4.33 There are various other aspects of the regulation of payout options, such as the handling of longevity risks, the marketing of variable annuities, and the calculation of regular payments in phased withdrawals and of initial payments in variable annuities but these will be discussed under provider regulation in the next section since the rules would effectively constrain the policies of different providers rather than the choices available to retiring workers.
- 4.34 The policies set out above imply the offer of constrained choice to retiring workers, mandating through one form or another a minimum use of annuitization and allowing constrained choice from a menu of other instruments. To enable workers to make prudent and wise decisions the authorities would need to compile a comprehensive database of retirement products, highlighting their main features, their cost and their performance.
- 4.35 In most countries, the collection of data on annuities and other types of retirement products is very limited. Denmark and Sweden are notable for failing to collect any data on the distribution and performance of different types of retirement products, despite the preponderant use of variable annuities. A mitigating factor in both Denmark and Sweden is that annuity contracts are based on collective labor agreements where representatives of employers and workers monitor the performance of annuity providers.

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³⁴ See Milevsky (2005) and Scott et al (2007) for a discussion of the advantages of this approach, especially in the case of deferred annuities without refunds. The idea that retirement and annuitization should not be linked has been discussed in Milevsky and Young (2007) and Blake et al (2008).

- 4.36 Chile is the exception here in having a very rich database of life annuities. However, information on the performance of phased withdrawals is very limited, while available data do not allow the calculation of replacement rates at retirement.³⁵
- 4.37 In addition to compiling a comprehensive database, the authorities in different countries would also need to undertake programs to expand financial literacy. Such programs should target both active and retired workers and should cover financial issues arising during both the accumulation and payout phases of pension systems.
- 4.38 Finally, as emphasized above, countries that decide to offer a constrained choice of retirement products to retiring workers need to specify the product that will act as the default option. This will enable retiring workers that lack the necessary knowledge and sophistication for assessing the different features of pretty complex financial products to opt for a solution that enjoys government support and will protect them from the potentially abusive practices of brokers and selling agents. The considerable complexity of most retirement products implies a strong need for guidance and impartial advice. The default option will vary by country depending on local conditions and social preferences.
- 4.39 Specification of the default option will entail two main aspects. First, the type of retirement product that will be used as default. This will vary among countries, in some cases will be a fixed real annuity, in other a 'guarantee and bonus' variable annuity, and in others a phased withdrawal. The second aspect concerns the identity of the provider. If a centralized provider is created, this would most likely be specified in the default option. In a decentralized competitive market the default option will probably be based on a competitive auction that will allocate new undecided retirees to the institution that levies the lowest operating costs or offers the highest payout benefits.

4.3 The Regulation of Providers of Retirement Products

- 4.40 The regulation of providers of retirement products covers several issues. First and foremost is the overall institutional organization of the market and the basic choice between a centralized single provider and a decentralized competitive structure. Other issues cover the regulation of marketing and pricing policies and the prudential regulation of providers in conjunction with the types of risk assumed by them.
- 4.41 This paper does not address the readiness and sophistication of local financial and insurance markets to support the efficient offer of retirement products. Most developing and transitioning historically suffered from underdeveloped financial and insurance markets. However, over the past two decades, many countries in Asia, Eastern Europe and Latin America have opened their markets to large multinational entities, which have in many cases acquired dominant positions in individual countries. Although the 2008 global financial crisis offers a sharp reminder that even large and sophisticated financial groups suffer from lack of integrity and transparency and engage in abusive and

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³⁵ Blake et al (2008) argue that policymakers should allow flexible retirement products that take into account risk aversion and bequest motives, especially in countries with large first pillars, while also emphasizing the need for better information to workers regarding the various tradeoffs.

destructive practices, the fact remains that local financial and insurance markets cannot thrive if they remain isolated and do not benefit from the greater knowhow and expertise of large multinational financial groups.

4.42 In addition, local markets require the creation and promotion of a highly sophisticated and effective regulatory and supervisory framework. Again recent experience has shown that even in the most advanced countries, regulation and supervision have been ineffective and have allowed individual institutions to take excessive risks and mistreat their clients. Again, however, local markets need to be integrated to the global regulatory system and be able to adopt evolving sound practices in regulating and supervising the institutions operating in their midst.

4.3.1 The Regulation of Institutional Structure

- 4.43 Centralized provision of life annuities, usually through a public entity although it can in principle also be based on a highly regulated private entity, has several potential advantages. It allows for a larger base of risk pooling, especially if annuitization is compulsory. It also benefits from scale economies and avoids the heavy marketing costs that are incurred by decentralized providers. Since the achievement of lower operating costs is a critical attribute of pension systems that leads to better outcomes in the long run, this is a very significant advantage in favor of centralized provision, especially if centralized account administration and longevity insurance are combined with decentralized asset management.
- 4.44 The main disadvantages of centralized provision are the potentially weaker incentives for product innovation and operational efficiency that may result from compulsory participation and monopoly power. With public ownership and/or extensive public regulation, there is also a high risk of extraneous interference in annuity pricing and asset management. Such interference may well result in transferring the investment and longevity risks back to the state. The key requirement is to adopt robust governance safeguards with high levels of transparency and public accountability.³⁶
- 4.45 Centralized provision is quite common. The zero and first public pillars, where they exist, rely on centralized provision through a single public agency. As they almost always involve the offer of inflation-indexed compulsory lifetime annuities, their products play a central part in the annuity markets of most countries.
- 4.46 Denmark and Sweden have gone one step further and have used centralized public agencies for the offer of supplementary lifetime annuities. These operate alongside private providers that offer industry or employer schemes covered by collective labor agreements as well as personal pension plans. Their presence and the prevalence of collective labor agreements clearly have an important impact on the functioning of private annuity providers.

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³⁶ In recent years, several countries have made considerable progress in streamlining and strengthening the management and governance of their public pension funds. Vittas et al (2008) review the performance of four public pension funds under improved governance structures in four OECD countries.

- 4.47 The Danish ATP operates a compulsory pension scheme with centralized asset management and offers variable 'guarantee and bonus' annuities. Despite its public status, it has often taken the lead in promoting product innovation and adopting sophisticated asset management (Vittas 2008).
- 4.48 The Swedish PPM is responsible for the maintenance of accounts and the payment of benefits as well as for handling the longevity risk of life annuities. For 'guarantee and bonus' annuities it also retains responsibility for centralized asset management and appoints internal and external asset managers for this purpose. But in the case of 'unit-linked' annuities, asset management is decentralized.
- 4.49 This system, which is also used for the accumulation phase, allows participants to select investment funds from an approved list of asset managers. The PPM collects all individual asset mandates and transfers funds to the selected asset managers without revealing the names of their clients. Sweden authorizes 70 asset managers that operate 700 funds, offering a bewildering choice to retirees (Palmer 2008). In most countries, half a dozen asset managers, each with 5 or 6 funds, will be more than sufficient.
- 4.50 The Danish and Swedish experiences show that, despite their weaker incentives, public entities can take the lead in promoting product innovation or adopting innovative investment strategies. The Danish ATP has been a leader in the pricing of life annuities and the use of long-term interest rate swaps and other asset management techniques. In Sweden the combination of centralized administration with decentralized asset management has been a public sector innovation, which has then been copied by the private sector (Palmer 2008).
- 4.51 Countries that adopt a centralized structure could use a public entity for the maintenance of accounts and the payment of benefits as well as for handling the longevity risk of life annuities, but organize asset management on a decentralized basis. This would be attractive in the case of unit-linked variable annuities, allowing participants to select investment funds from an approved list of asset managers. A competitive bidding process could be undertaken at specified time intervals to ensure that the most efficient institutions with the lowest operating fees are allowed to participate. The centralized institution would collect all individual asset manades and transfer funds to the selected asset managers without revealing the names of their clients.
- 4.52 Countries that favor a decentralized competitive market structure aim for greater competition, innovation and efficiency. However, because of scale economies and high marketing costs, decentralized markets suffer from market consolidation, veering over time toward oligopolistic structures and the prevalence of a small number of providers. This negates their innovation and efficiency advantages.
- 4.53 The case for a decentralized competitive structure is significantly weakened if strict restrictions apply to annuity products and their pricing. It is also weakened if insurance companies use common life tables, in which case competition is effectively

limited to asset management and marketing campaigns. Thus, countries that adopt decentralized competitive structures need to monitor closely the performance of providers of retirement products to ensure that profit margins are reasonable and the benefits of competition and innovation are not eroded by increasingly oligopolistic and wasteful practices.

- 4.54 Another possibility is to have decentralized account administration and decentralized asset management with centralized management of the longevity risk. This will address the problems posed by the non-diversifiable component of longevity risk. However, decentralized account administration will not provide any significant benefits and will suffer from wasteful marketing expenses and from a potential misuse of economies of scale by large insurance groups that have a poor record as asset managers. The centralization of both account administration and longevity insurance, combined with decentralized asset management, would seem a superior option.
- 4.55 Taking into account the competitive inefficiencies of decentralized markets, especially in supplying variable annuities, and the advantages of allowing constrained choice to retiring workers from a broader menu of retirement products, an attractive approach to the organization of market structure may well be to combine centralized and decentralized provision. A centralized provider, focusing on account administration and longevity insurance, in conjunction with decentralized asset management, could be used for variable annuities, while fixed real and nominal annuities could be offered through a decentralized competitive market.

4.3.2 The Regulation of Marketing and Pricing Policies

- 4.56 The regulation of marketing and pricing policies varies considerably between centralized and decentralized provision and between fixed and variable annuities. In general, it is much simpler in a centralized market structure. There is no need for elaborate controls on marketing campaigns, the creation of electronic quotation systems, and the application of conduct rules, such as 'know-your-customer' rule. Pricing policies need to reflect all relevant variables to ensure long-run sustainability and avoid unintended inter- and intra-generational transfers, but there is no concern about price dispersion and exposure to deceptive policies and heightened bankruptcy risk. The marketing of variable annuities is not faced with the perverse incentives that afflict decentralized markets.
- 4.57 In the case of fixed nominal or real life annuities, the centralized institution needs to respond to enquiries from retiring workers by providing appropriate quotations taking into account the choice of product and age cohort of applicants. To be able to do this effectively, it needs to construct life tables by product and cohort and also apply the appropriate yield curves to calculate the initial annuity payments by type of product. The centralized institution must also set out a clear policy on the treatment of retiring workers with impaired health.

- 4.58 The main challenge for the centralized provider is the creation of a sophisticated delivery system where trained professionals have access to detailed data and are able to respond in a prompt and efficient manner to enquiries from retiring workers. To ensure a high quality of service, this component of the centralized structure may be outsourced through competitive bidding to a small number of private operators, subject to clearly defined standards of accuracy and speed.
- 4.59 In the case of 'guarantee and bonus' variable annuities, the centralized institution needs to set out clearly the calculation of initial payments, the offer of guaranteed benefits, and the determination of annual bonuses. It also needs to clarify its policies on the reversibility of annual bonuses. Using conservative assumptions with regard to the technical rate of interest and life tables will result in low initial payments that will give rise to significant transfers from older to younger cohorts unless the resulting large bonus reserve is partly funded with long-term debt. All these policy variables and objectives need to be clearly spelled out in a transparent and effective way.
- 4.60 In the case of unit-linked annuities with decentralized asset management, the two main concerns are the selection of authorized asset managers, the organization of periodic switching among asset managers, and the handling of minimum guarantees. The management of longevity risk needs to be clarified in both types of variable annuities, including the treatment of retiring workers with impaired health.
- 4.61 The treatment of impaired lives poses a difficult managerial and regulatory challenge linked to the political difficulties of defining the admissible level of health impairment and the required documentation for establishing the health status of individual annuitants. In decentralized markets, there is greater room for experimentation as is shown by recent developments in the UK annuity market where some companies offer better prices to smokers relative to non-smokers, while other companies use postcodes as a factor in annuity pricing. The latter approach is based on the hypothesis that people who reside in the same neighborhood are likely to have similar backgrounds and similar life expectancies (Sigma 2008). Centralized providers in Denmark and Sweden have not so far created separate longevity pools based on health status.³⁷
- 4.62 The regulation of marketing and pricing policies presents a major challenge in decentralized competitive markets. The selling of life annuities, especially fixed nominal or real annuities, requires considerable marketing effort by insurance companies and

³⁷ Creating multiple annuity pools based on state of health and expected longevity is exposed to the risk of

would contain pressures for an ever expanding number of smaller pools. Nevertheless, incorporating various other factors, such as gender, race, occupation, socioeconomic status, neighborhood and genetics, would raise highly sensitive political issues.

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political manipulation and pressure to expand the number of pools. Retaining one pool irrespective of health status is less problematic in a social security context, especially if universal healthcare is also provided. This is because redistribution losses by people of impaired health on the pension front will most likely be offset by redistribution benefits on the healthcare front. However, for mandatory capitalization pension systems that place a strong emphasis on the link between contributions and benefits, it is difficult to defend a single annuity pool. Allowing a very small number of separate pools for large groups of people with clearly identifiable characteristics and expected outcomes could address this problem in a way that

deployment of brokers and agents in explaining the relative advantages of life annuities over lump sums and phased withdrawals. Brokers tend to have strong incentives to influence the decision to annuitize and derive considerable benefits from channeling retiring workers to providers who offer the highest commissions and not necessarily the best prices and returns to annuitants.

- 4.63 The first requirement of an effective regulation of marketing in a decentralized competitive market is compliance with basic conduct rules, such as the 'know-your-customer' rule and an adequate disclosure of the terms and conditions of different products. However, because fixed life annuity products are highly complex as well as irrevocable and non-portable, there is also a need for extensive training of agents and brokers. In addition to adequate training, brokers need to pass a certification test as well as the standard 'fit and proper' test. Licensed brokers must be legally obligated to represent their clients, must generate their income from commissions on the sale of annuities, and must not be permitted to accept volume-related remuneration from insurers.
- 4.64 In the case of fixed annuities, adopting an electronic quotation system, such as the one introduced in Chile in 2004, merits serious consideration. This is a centralized service that compiles and validates individual data on retiring workers and solicits quotes from participating institutions. Such a system reduces the influence of brokers, lowers the search costs of retiring workers, enhances the quality of information available to them, and ensures broad access to competitively prices annuities.
- 4.65 The structure and level of commissions payable to brokers and agents need to be closely monitored and to be subject to caps if they become too high and give rise to market distortions. In addition to being subject to an upper limit, such as the 2.5 percent cap introduced in Chile in 2004, commissions could be made payable over the whole duration of the annuity contract and not concentrated in the first few years. One way to achieve this is by prohibiting upfront fees on retiring workers and only allowing regular fees on monthly payments.
- 4.66 With regard to pricing policies, providers of fixed life annuities in decentralized competitive markets should be free to determine their own prices and adopt aggressive or passive marketing campaigns as they see fit. The supervisors need to monitor the pricing and marketing campaigns of individual providers to ensure that they do not adopt deceptive policies that could harm pensioners in the longer run. They also need to ensure that providers maintain adequate technical reserves calculated on a sound basis (this topic is addressed in the next section on the regulation of risk management).
- 4.67 The ineffectiveness of price competition is underscored by the wide dispersion in the prices of fixed nominal or real life annuities. The range of annuity quotations exceeds 20 percent in most markets, including Chile and the UK.³⁸

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³⁸ Annex 2 reviews the variation and dispersion of annuity prices in the UK on data obtained from the website of the FSA.

- 4.68 Strict regulation of the prices of fixed life annuities is one way of addressing the issue of price dispersion but it entails both benefits and costs as is clearly indicated by the experience of Switzerland. The use of regulated annuity conversion factors for life annuities protects retiring workers of different cohorts from large fluctuations in market prices of both assets and annuities and also avoids an excessive dispersion of annuity prices across annuitants with similar characteristics. However, large income transfers across annuitants of different gender and marital status can be generated if price regulation is not carefully calibrated. In addition, the solvency of annuity providers can be jeopardized if regulated prices are not subject to flexible adjustment to changing market conditions, including changing interest rates and longevity experience.³⁹
- 4.69 The marketing of variable annuities in a decentralized market raises even more complex issues. If providers are free to set initial payments and apply entry (front-load) and exit fees, there will be a strong temptation to adopt deceptive and irresponsible practices, offering annuitants high initial payments in order to attract their business but offering low bonuses in subsequent years to compensate providers for the elevated initial payments. If switching is not allowed, annuitants will be captive in providers that may produce worse results over the long term. Of course, poor bonus performance will reduce the attractiveness of such providers but retiring workers may still be tempted by the high initial payments. Lack of comprehensive information on long-term performance may inhibit effective scrutiny of different providers. Hefty exit fees may also be employed to discourage low-risk annuitants from switching when providers alter the risk profile of their business.
- 4.70 To protect retirees from such practices, which are not uncommon in retail financial markets, policymakers may be inclined to specify the calculation of initial payments. This may involve the setting of a low rate of interest for discounting future payments and a common mortality table that may allow for some improvements in longevity. Following this approach will entail low initial payments but will permit higher future bonuses if reserves are invested in higher-yielding assets. To protect retiring workers caps on commissions and other operating fees may also be applied.
- 4.71 When initial payments are subject to detailed regulations and are common for all providers, competition in the variable annuity market depends on the level and stability of prospective bonuses. The latter are a function of investment returns, operating costs and

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³⁹ These two problems were experienced in Switzerland between 1985 and 2002. A fixed annuity conversion factor was imposed in 1985 on the decentralized market when the mandatory pillar was introduced. This was set at 7.2 percent, was the same for single and joint life annuities, and was kept constant for 17 years despite large fluctuations in interest rates and a secular increase in longevity. It caused significant transfers from single male to female pensioners and also put the finances of pension funds under considerable strain (Buetler and Ruesch 2007).

⁴⁰ When this approach is followed, care must be taken to avoid specifying a similarly low rate of interest for the creation of technical reserves. Such a misguided approach will force annuity providers to maintain unnecessarily high levels of reserves and will allow little room for investing in higher-yielding assets. For a discussion of this point in the context of payout policies in some transitioning European countries, see Vittas et al (2010).

longevity experience and the policy of profit distribution between annuitants and shareholders.

- 4.72 Retiring workers participating in variable annuities should be encouraged to select providers with high profit participation rates, low operating costs, diversified investment portfolios, and a consistent record of sound performance. Focusing on recent past performance, which is often underscored by selling agents, is not sound practice since past returns are not good predictors of future performance.
- 4.73 Market regulators need to ensure that annuity providers follow transparent and consistent policies on the handling of operating costs and the distribution of profits between shareholders and annuitants. The rules should discourage the use of transfer pricing whereby financial services obtained from affiliated companies are billed at artificially high prices. In addition, profit distribution policies may be subject to minimum regulatory requirements. For instance, the profit sharing rate may be set at 90 or even 95 percent of annual profits. Annuity providers are compelled to absorb any negative profits but are allowed to recoup their losses in subsequent years before determining profits available for distribution.
- 4.74 Regulating the profit sharing rate introduces considerable rigidity in the system. A more flexible alternative is to allow annuity providers to determine their own profit distribution policies but to require a high level of transparency. A central register should be created to compile comparative data on a consistent and informative basis on the investment performance and bonus policies of different providers.
- 4.75 It is interesting to note that neither Denmark nor Sweden has a central register compiling performance data on a systematic basis. However, in both countries, the offer of variable annuities is based on broad collective labor agreements. Thus, representatives of workers and employers monitor the performance of providers and protect the interests of pensioners. In a system of non-employer-based individual accounts, a central register of performance data and an effective supervision of providers are indispensable.
- 4.76 Competition in the market for variable annuities where longevity risk is shared among annuitants may on occasion take a perverse form. In order to increase their market share and expand their business annuity providers with a preponderance of low-risk clients may decide to offer attractive terms to new clients with higher-risk characteristics, effectively forcing low-risk annuitants, i.e. individuals with short life expectancy, to share the higher longevity risk of high-risk annuitants and thus causing unfair transfers across different groups. Admittedly such marketing campaigns may not be easy to design and implement. But a more likely occurrence is a friendly or hostile merger of two providers with different risk profiles. When mergers take place or marketing policies undergo drastic change, annuitants should be allowed to switch to another provider within a specified period and without incurring any exit fees.
- 4.77 An important aspect of pricing regulation is the legal requirement in many European countries to use unisex mortality tables. This has potentially adverse effects on

different providers and may distort marketing policies. A compensation mechanism is necessary to cope with the adverse effects of the compulsory use of unisex mortality tables. With such a mechanism, annuity providers are required to calculate their technical reserves both on gender-specific and on unisex mortality tables. A government agency computes the factor that is needed to equate the total reserves under each calculation. Providers for which the reserves under gender-specific mortality tables are higher than the reserves calculated with unisex tables multiplied by the specified factor receive a compensating transfer through the government agency from providers with the opposite result.

- 4.78 The marketing and pricing of phased withdrawals also raise important concerns. Because phased withdrawals do not generate high levels of upfront commission income, there is little interest by brokers and selling agents to promote their use by retiring workers. For this reason the marketing of life annuities and phased withdrawals has been highly asymmetrical in Chile (Rocha and Thorburn, 2007). In other countries, such as the UK, the marketing of phased withdrawals has been distorted by the imposition of hefty exit fees by insurance companies, penalizing both retiring and retired workers who wanted to transfer their balances to a competing provider.
- 4.79 The pricing of phased withdrawals depends on the appropriate use of mortality tables and discount rates. In countries where phased withdrawals are used by low-income and low-balance people, the mortality table should reflect their lower life expectancy. The discount rate should be based on prospective long-term returns and should not be dominated by recent performance. These provisions are necessary in order to protect pensioners from an accelerated depletion of their balances and to create a level playing filed with life annuities.

4.3.3 The Regulation of Risk Management

- 4.80 The regulation of risk management addresses the level of technical reserves and risk capital that is required to support the specific risks undertaken by different providers of retirement products. It also covers the use of internal risk management and control systems and the application of stress tests for assessing the vulnerability of individual institutions to internal and external shocks.
- 4.81 The issues are conceptually the same for centralized and decentralized structures, although in competitive markets individual institutions may be tempted to adopt more risky policies. However, centralized single providers face different risks such as the risk of complacency, persistence with misguided policies and failure to take corrective action. Thus, despite the absence of competitive pressures for imprudent initiatives, the risk management policies of centralized entities need to be as closely monitored as those of competitive entities in a decentralized market. In fact, both the ATP in Denmark and the PPM in Sweden broadly follow the same regulatory and accounting rules as private insurance companies and pension funds in these countries and are supervised by the same national supervisory agencies.

- 4.82 The management of operational, counterparty and liquidity risks presents the same challenges to all types of institutions, irrespective of the risk characteristics of the products they offer. Losses from operational risk may result from fraud or administrative failure, such as for example failure to comply with the requirement of legal segregation and external safe custody of assets, while losses from counterparty risk may arise from performance failure of a contractual counterparty. Installation of appropriate internal control systems helps lower losses from such risks. Control systems need to segregate duties and avoid conflicts of interest in assigning responsibilities.
- 4.83 The complexity of risk management and its regulation increase significantly with regard to underwriting risk, which as noted above covers investment, inflation and longevity risks. This depends on the risk characteristics of the products offered by different institutions. Institutions that do not assume any investment or longevity risk do not face underwriting risk. Such institutions, which include providers of phased withdrawals and unit-linked products without any guaranteed benefits, do not need to build any technical reserves. Their liabilities are equal to the value of their assets. Their capital requirements also are simple and straightforward. They are subject to a relatively small minimum initial capital and a capital adequacy requirement. The latter is related to the volume of assets under management and ranges between 1 and 2 percent of AUM.
- 4.84 Two interesting questions arise with regard to the composition and utilization of the capital reserve of such providers. The first question concerns whether the capital reserve should be satisfied only with equity injections or whether subordinated long-term debt could also be used to attain the same objective of solvency and stability but at a lower effective cost. This is particularly relevant for providers that belong to large financial conglomerates. In practice, parent companies use long-term debt rather than group equity to finance their stakes in subsidiaries. It is thus more consistent with prevailing practice to authorize and even require the use of subordinated debt for a significant proportion of the capital reserve.
- 4.85 The second question concerns the utilization of the capital reserve. Imposing a rule that the capital reserve should be invested in the same assets as client funds ensures an alignment of interests between the providers and their clients. However, this argument does not hold if a substantial part of the capital reserve is financed with subordinated debt. In these cases, only the equity component of the capital reserve should be required to be invested in the same assets as client funds. The proceeds of subordinated debt should be invested in callable bonds of similar maturity.
- 4.86 The valuation of assets of providers of phased withdrawals and unit-linked products should be based on market values. This is essential for a fair calculation of the value of benefits. The majority of assets are invested in equities and bonds traded on public markets. A small proportion may be placed in venture capital, infrastructure and real estate but such investments are ideally made through specialized investment funds. Their valuation is not at market prices but is based on model valuations provided by the managers of these funds or by independent appraisers. Model valuations are also used in the case of equities and bonds that are not actively traded.

4.87 The regulation of risk management of institutions that assume investment, inflation and longevity risks faces much greater challenges. In countries with advanced financial and insurance markets, the first step is to require 'fair value' accounting for the valuation of both assets and liabilities. Market values should be used as fair values for assets that are traded on active and liquid markets but, for less liquid assets, fair valuation could be obtained by applying acceptable valuation models. All value changes - realized and unrealized - should ideally be shown in the profit and loss account.

4.88 The valuation of liabilities is conceptually more difficult since there is no active market for insurance and pension liabilities and there are therefore no readily observable market prices. By necessity, fair valuation is based on valuation models. The first step is to calculate future actuarial liabilities by applying appropriate survival probabilities that reflect reasonable estimates of future improvements in longevity. Actuarial liabilities are calculated by product and cohort. Individual institutions may be allowed to use their own mortality tables, reflecting the demographic characteristics of their own clienteles but they should be required to justify their choice, both with regard to their pricing decisions and with regard to their reserving policies. The present value of estimated actuarial liabilities are then calculated by applying market-based maturity-dependent discount rates, obtained from a zero-coupon yield curve. Ideally, this should be based on AA corporate bond and swap rates. The decomposition and maintenance of separate technical reserves by type and level of guaranteed benefits should also be required.

4.89 Asset and liability valuations should then be subject to stress tests that calculate the impact of significant changes in market prices on the financial position of individual institutions. Stress tests on insurance companies and pension funds are now applied in several countries, but the various stress tests are still at an early stage of development, are specified in static terms, do not reflect past experience, and are invariant to the state of financial markets. Ideally, the stress tests should take into account the historical variance and covariance of asset returns and should allow for the state of financial markets. The required solvency margin should be related to the size of the deviation of current prices from long-term trends. If individual institutions maintain reasonably matched positions between their assets and liabilities, the stress tests would have little impact on their equity positions or buffer funds. However, if they exhibit considerable deviation from full matching, the stress tests would indicate the size of the buffer fund that would be required to ensure solvency. The stress tests should also cover changes in future longevity and should assess the adequacy of the longevity risk fund.

4.90 The above approach could not be followed in countries where financial markets suffer from low volumes of trading, assets are illiquid, and institutions adopt 'buy and hold' strategies. In these cases, the approach used by Chile has considerable appeal. Market rates of interest are used for calculating the technical reserves of liabilities that are matched by assets of similar duration but lower prescribed discount rates are

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⁴¹ Problems arise if the valuation of illiquid assets becomes highly problematic, as has been highlighted by the recent experience of the market for sub-prime mortgage securities. A prudent institution would invest only a small proportion of its assets in such potentially illiquid and unstable markets.

mandated for discounting unmatched liabilities. Coupled with higher capital reserve requirements for unmatched liabilities, this approach protects providers of fixed life annuities from adverse changes in interest rates.

- 4.91 Full matching of assets and liabilities minimizes exposure to investment and inflation risks but, as discussed in section 3.2, may prove overly expensive and even infeasible. It requires full access to long-duration inflation-indexed financial instruments for hedging the inflation risk of fixed real annuities. However, most countries do not have an adequate supply of such instruments. Use of various derivatives, including interest rate swaps and swaption contracts as well as interest rate futures and callable debt, may be used for managing investment and prepayment risks, but it is essential to monitor closely the use of such products and the counterparty risk they entail.
- 4.92 The regulation of the management of longevity risk also faces major challenges. An essential requirement is to avoid the use of outdated mortality tables, which may be particularly detrimental in annuity pricing but may also cause problems for reserving policies. Developing countries tend to use outdated mortality tables because they lack comprehensive local data and rely extensively on mortality data from foreign countries. A serious effort must be made to build reliable and detailed data on longevity.
- 4.93 Reinsurance is an option for managing longevity risk, especially at the tail end of the age distribution. However, regulators need to remove any restrictions on the localization of insurance assets to encourage resort to global reinsurance markets. The use of reinsurance needs to be closely monitored to ensure that foreign reinsurers are respectable and creditworthy.
- 4.94 The use of longevity bonds and longevity derivatives could be encouraged when these instruments are well established in global markets. However, the development of deep and reliable markets in these instruments is likely to take considerable time. In the meantime, providers of products with investment and longevity risks could adopt risk-sharing arrangements with annuitants. Risk sharing is widely used in Denmark and Sweden for both traditional participating 'guarantee and bonus' annuities and for unit-linked annuities.
- 4.95 In the former case, providers assume the investment and longevity risks up to the level of guaranteed benefits but share these risks among annuitants beyond that level. In the latter case, the investment risk is assumed by annuitants reflecting the portfolio of the investment funds they select but the longevity risk is shared among annuitants either on a cohort and product basis or across all annuitants of each type of product. Improvements in longevity as well as changes in investment returns are reflected in annual benefits.
- 4.96 Risk-sharing arrangements have many potential advantages but also introduce their own challenges. A high level of transparency and integrity on the part of annuity providers is required as well as transparent and robust rules to ensure consistent long-term fairness in the distribution of profits between shareholders and policyholders. This is clearly a more important issue in the case of decentralized markets, where market

discipline may be less powerful than is often assumed, but it is also relevant in the case of public monopolies, especially in ensuring a fair treatment of all cohorts and avoidance of the use of surpluses for extraneous purposes.

- 4.97 The introduction of government guarantees for holders of retirement products should be considered. Such guarantees could well be necessary in a system of mandatory saving for retirement purposes. They should cover both the accumulation and payout phases and should include life and term annuities as well as phased withdrawals. The government guarantees could emulate evolving practice in deposit insurance schemes, including upper limits on the amounts insured and a reasonable amount of coinsurance by pensioners in order to minimize the possible loss of market discipline at the point of purchase.
- 4.98 Guarantees should be financed by ex ante or ex post risk-based assessments, but some reliance on budgetary resources could also be contemplated. Adopting a speedy resolution mechanism providing for early interventions in providers facing financial difficulties and nearing insolvency would contribute to containing the costs of the guarantees. The potential cost of government guarantees should be estimated and such estimates should be used to determine risk-based premiums on annuity providers.
- 4.99 Expanding the supply of financial instruments to promote efficient liability hedging by individual institutions should also be a policy priority. The imposition of inflation indexation in the absence of inflation-indexed instruments is not advisable as it may lead to the offer of poorly priced products with hefty risk premiums. But the development of long-duration inflation-indexed instruments requires a significant modernization of public debt management, focusing on the promotion of benchmark issues of inflation-linked bonds. It is also necessary to promote the issuance of inflation-linked corporate and mortgage bonds so that the offer of fixed real annuities does not rely entirely on public sector issues.
- 4.100 In addition, governments would need to promote the development of derivative markets, such as long-term interest rate swap and swaption contracts, to allow hedging the investment risk of long-term liabilities as well as the use of longevity bonds and reinsurance markets to support the hedging of longevity risk. Developing longevity bonds and derivatives is likely to be a tall order for most countries around the world since such products have yet to emerge even in the most advanced financial markets. While long-term interest rate swaps and other derivative instruments are well established in global financial centers, their development in most emerging and low-income countries is still a long way off.

Annex 1

The 2008 Transformation of the Chilean Pension System

In 2008, the Chilean system was significantly reformed. This annex provides a brief summary of the changes that are germane to the issues addressed in this paper.

First, a new public benefit, the PBS (Pension Basica Solidaria), was introduced. The PBS is paid to all aged people who fall in the lowest 3 quintiles (60 percent) of the income distribution and have no pension of their own. It will replace the former PASIS, which was a means-tested benefit.

After a brief four-year transition period, the PBS will amount to 75,000 pesos, equivalent to USD 125 and equal to 19 percent of the average wage. It is significantly higher than the PASIS, which amounted to 12 percent of the average wage. However, it is at the low end of the range of flat benefits paid in various high-income countries, such as Australia, Canada, Denmark and New Zealand.

Second, the Minimum Pension Guarantee (MPG), which covered all workers with a minimum of 20 years of contributions and amounted to between 23 and 27 percent of the average wage, was replaced by the Pension Solidarity Supplement (APS or Aporte Previsional Solidario). This is paid to all individuals in the lowest 3 quintiles of the income distribution with a private pension and irrespective of their contributory record.

The APS is equal to the PBS subject to a clawback provision of 29.4 percent of the private pension (not the total income) of eligible pensioners. This means that the supplement is eliminated when the private pension reaches 65 percent of the average wage. The latter is known as PMAS (Pension Maximal con Aporte Solidario).

Third, the rules for early retirement have been modified and tightened slightly. Prior to 2008 and following the 2004 changes, early retirement was allowed if individual workers could obtain a fixed real annuity that was equal to 70 percent of their own average real earnings over the 10 years preceding retirement (excluding months of inactivity) and 150 percent of the MPG. The first requirement continues to apply but the second was replaced with a requirement to obtain an annuity equal to 80 percent of the PMAS or 52 percent of the average wage. (This is more stringent than the previous rule since 150 percent of the MPG amounted to between 34.5 and 40.5 percent of the average wage. However, the 70-percent-of-own-past-earnings rule usually determines eligibility for early retirement.)

Fourth, payment of the APS will start at the normal retirement age of 65 for men and 60 for women. Moreover, the APS will be based on the imputed private pension that workers could obtain if they continued to work until the normal retirement age.

Fifth, the government continues to provide longevity risk to pensioners who opt for phased withdrawals but this is now paid at the somewhat lower level of the PBS and covers only individuals who fall in the 3 lowest quintiles of the income distribution. Prior to the 2008 changes, the monthly benefit from phased withdrawals could not fall below the MPG level. When the account balance was exhausted, the government assumed the payment responsibility. Thus, longevity risk was covered at the level of the MPG. After 2008, the monthly payments from phased withdrawals cannot fall below the PBS.

Sixth, the calculation of the monthly benefit of phased withdrawals has been tightened. Instead of using the average remaining life expectancy, the calculation will be based on a higher life expectancy. This will engender the creation of a significant reserve that will limit to 5 percent the probability of workers outliving their balances. This approach lowers the exposure of the government to long-lived individuals. As before, remaining balances on the accounts of deceased individuals will be included in their estate.

Several other changes were introduced in 2008 but the above summarize those that are germane to the issues addressed in this paper. An important policy issue concerns the determination of the level of the PBS in the future. The current intention is to maintain the value of the PBS (and by implication those of the APS and PMAS) constant in real terms. This will imply a progressive lowering of their level relative to average wages.

Annex 2

The Variation and Dispersion of Annuity Prices

This appendix discusses the variation and dispersion of annuity prices. It focuses on annuity quotations that were obtained from the website of the UK Financial Services Authority (UK FSA). The website has been created in order to increase transparency in the annuity market and strengthen competition. It is part of the so-called Open Market Option (OMO) that aims to improve the marketing and selling of annuities, lower the dispersion of annuity prices, and protect retiring workers from the potentially distorting and harmful influence of brokers.

It is noteworthy that despite the creation of the website and the promotion of the Open Market Option, considerable dispersion continues to be observed among annuity quotations. No information is available on the dispersion of prices in actual annuity contracts. Only 8 companies participate in the Open Market Option and of these only 5 offer quotations for inflation-linked annuities. The majority of companies offer annuities only to workers that have maintained accumulation accounts with them.

The following 3 tables report data on internet quotations obtained on July 22, 2009. They relate to immediate annuities payable monthly in advance for a capital premium of GBP 100,000. The first set covers a single life annuity for a non-smoker male aged 65 with no guaranteed period of payment (GPP). The second set allows for a 10 year GPP. And the third set covers a joint life annuity with a 10-year GPP and a 67 percent annuity for a spouse aged 60.

The data show that even under the OMO, there is significant dispersion in annuity prices. This ranges between 21 and 25 percent for fixed nominal annuities. It is higher at between 25 and 30 percent for 3 percent escalating annuities but narrows to 14-15 percent for fixed real annuities. The latter is the result of one company quoting higher fixed real annuities than 3% escalating ones, implying that this company expects inflation over the period of the annuity to be below 3 percent.

Initial payments for real fixed annuities are on average 36 percent lower than for fixed nominal annuities in the case of single life annuities with or without the 10-year guaranteed period of payment. For joint life annuities, the difference is even greater at 42 percent. Similarly, initial payments for annuities escalating at 3 percent start 28 and 33 percent respectively below those of fixed nominal annuities.

Table A1: UK: Single Immediate Life Annuities, Male 65

Company	Fixed Nom	3% Esc	RPI	Esc/Fix	RPI/Fix
Aegon/Scottish Equitable	597	436		73%	
Canada Life	588	427	368	73%	63%
Legal & General	567	410	349	72%	62%
Standard Life	553	393	359	71%	65%
B & C E Insurance	540				
Scottish Widows	519	361	316	70%	61%
Friends Provident	516	364		71%	
AXA	478	336	347	70%	73%
Average	545	390	348	72%	64%
Standard Deviation	37	34	18		
Range	119	100	52		
Range/Average	22%	26%	15%		

Source: UK FSA website – quotations July 22, 2009

Table A2: UK: Single Immediate Life Annuities, Male 65, 10Y GPP

Company	Fixed Nom	3% Esc	RPI	Esc/Fix	RPI/Fix
Aegon/Scottish Equitable	586	429		73%	
Canada Life	577	420	362	73%	63%
Legal & General	559	404	345	72%	62%
Standard Life	538	384	351	71%	65%
Scottish Widows	508	354	311	70%	61%
Friends Provident	508	359		71%	
AXA	471	332	342	70%	73%
Average	535	383	342	72%	64%
Standard Deviation	39	34	17		
Range	115	97	51		
Range/Average	21%	25%	15%		

Source: UK FSA website – quotations July 22, 2009

Table A3: UK: Joint Immediate Life Annuities, M65, F60, F67%, 10Y GPP

	Fixed Nom	3% Esc	RPI	Esc/Fix	Real/Fix
Company					
Aegon/Scottish Equitable	511	350		68%	
Canada Life	503	342	285	68%	57%
Legal & General	495	335	275	68%	56%
Standard Life	469	315	284	67%	61%
Scottish Widows	440	287	247	65%	56%
Friends Provident	440	291		66%	
AXA	397	257	268	65%	68%
Average	465	311	272	67%	58%
Standard Deviation	38	32	14		
Range	114	93	38		
Range/Average	25%	30%	14%		

Source: UK FSA website – quotations July 22, 2009

Table A4 presents data on annuity conversion factors and the difference between various types of annuities. The annuity conversion factors (ACF) are based on the quotations shown in Tables A1 to A3. The ACF show the amount of annual income for every 100 dollars or pounds in capital premiums. Thus, the ACF for a fixed nominal single life annuity for a non-smoker male aged 65 amounts to 6.54 percent. For the same annuity contract but with a 10-year guaranteed payment, the ACF suffers a very small decline to 6.42 percent or just 2 percent. Issuing a joint life annuity with the spouse aged 60 causes a larger fall to an ACF of 5.58 percent or a further decline of 13 percent. Buying a fixed real joint life annuity results in an ACF of only 3.26 percent. This is half the level of the fixed nominal single annuity. Buying inflation protection causes a marginal fall of 35 percent.

Table A4: Annuity Conversion Factors

		ACF	% of A	Difference
A.	Single M65 Fixed Nominal	6.54%		
B.	Single M65 10YGPP Fixed Nominal	6.42%	98%	2%
C.	Joint M65, F60, 10YGPP Fixed Nominal	5.58%	85%	13%
D.	Joint M65, F60 10YGPP Fixed Real	3.26%	50%	35%

Source: Calculated on the basis of the UK FSA annuity quotations of Tables A1 to A3

This large decline explains the reluctance of retiring workers to opt for fixed real annuities. However, unless retiring workers suffer from a serious illness, they would be unwise to choose fixed nominal annuities, especially in countries with a long history of high inflation. Table A5 shows the impact of inflation on the real value of annuity payments with the passage of time.

Table A5: Impact of Inflation on Real Value of Annuity Payments

Rate\Years	10	20	30
0.5%	-5%	-9%	-14%
1%	-9%	-18%	-26%
3%	-26%	-45%	-59%
5%	-39%	-62%	-77%
10%	-61%	-85%	-94%

Even at a low inflation rate of 1 percent, the real value of annuity payments falls by 18 percent after 20 years. With a moderate inflation of 3 percent, annuity payments decline by 45 percent in real terms 20 years after retirement and the falls are much more serious with higher rates of inflation. The problem of fixed nominal annuities is underscored by two observations. Inflation in the US averaged slightly over 3 percent since the early 1980s. With current estimates of life expectancy at retirement, between one third and one half of retirees would still be alive 20 years after retirement. Thus, inflation will impact a large number of retirees.

The relatively high inflation rate in the US suggests that even annuities denominated in a reserve currency will not protect against inflation. A reserve currency annuity provides protection against runaway domestic inflation and domestic currency depreciation but not against global inflation.

References

Andersen, Carsten and Peter Skjodt. 2007. 'Pension Institutions and Annuities in Denmark', Policy Research Working Paper No. 4437. Washington, D.C.: The World Bank.

Babbel, David F. and Craig B. Merrill. 2006. 'Rational Decumulation', Wharton Financial Institutions Center Working Paper No. 06-14. Wharton School, University of Pennsylvania.

Blake, David. 1999. 'Annuity Markets: Problems and Solutions', *The Geneva Papers on Risk and Insurance* 24, 358-375, July.

Blake, David and Robert Hudson. 2000. 'Improving Security and Flexibility in Retirement'. London: The Pensions Institute, Birkbeck College, University of London.

Blake, David, Andrew Cairns and Kevin Dowd. 2008. 'Turning Pension Plans into Pension Planes', Discussion Paper PI-0806. London: The Pension Institute.

Brown, Jeffrey, Olivia S. Mitchell, and James M. Poterba. 2001. 'The Role of Real Annuities and Indexed Bonds in an Individual Accounts Retirement Program', in Brown, Jeffrey, Olivia S. Mitchell, James M. Poterba and Mark J. Warshawsky, *The Role of Annuity Markets in Financing Retirement*, MIT Press, Cambridge, Massachusetts.

Brunner, Gregory Gordon and Craig Thorburn. 2008. 'The Market for Retirement Products in Australia', Policy Research Working Paper No. 4749. Washington, D.C.: The World Bank.

Buetler, Monika and Martin, Ruesch. 2007. 'Annuities in Switzerland', Policy Research Working Paper No. 4438. Washington, D.C.: The World Bank.

Cardinale, Mirko, Alex Findlater and Mike Orszag. 2002. 'Paying Out Pensions: A Review of International Annuities Markets', Research Report 2002-RU07, Watson Wyatt.

Davis, E. Philip. 2000. 'Issues in the Regulation of Annuities Markets', Center for Research on Pensions and Welfare Policies Working Paper 26/02.

Dus, Ivica, Raimond Maurer and Olivia S. Mitchell. 2003. 'Betting on Death and Capital Markets in Retirement: A Shortfall Risk Analysis of Life Annuities versus Phased Withdrawal Plans', MRRC Working Paper, WP2003-063. Ann Arbor: University of Michigan.

Fornero, Elsa and Elisa Luciano, eds. 2004. *Developing an Annuity Market in Europe*. Cheltenham, U.K.: Edward Elgar.

Hu, Wei-Yin and Jason Scott. 2007. 'Behavioral Obstacles to the Annuity Market', PRC WP2007-10. Philadelphia: Pension Research Council.

Impavido, Gregorio, Craig W. Thorburn and Mike Wadsworth. 2003. "A Conceptual Framework For Retirement Products: Risk Sharing Arrangements Between Providers and Retirees', Policy Research Working Paper No. 3208. Washington, D.C.: The World Bank.

James, Estelle and Dimitri Vittas. 2000. 'The Decumulation (Payout) Phase of Defined Contribution (DC) Pillars: Policy Issues in the Provision of Annuities and Other Benefits', Policy Research Working Paper No. 2464. Washington, D.C.: The World Bank.

James, Estelle and Dimitri Vittas. 2000. 'The Decumulation (Payout) Phase of Defined Contribution (DC) Pillars: Policy Issues in the Provision of Annuities and Other Benefits', Policy Research Working Paper No. 2464. Washington, D.C.: The World Bank.

James, Estelle, Xue Song and Dimitri Vittas. 2001. 'Annuity Markets Around the World: Money's Worth to Annuitants and How do Insurance Companies Cover It?', CeRP Working Papers 16/01. Torino: CeRP.

Knox, David. 2000. 'The Australia Annuity Market', Policy Research Working Paper No. 2495. Washington, D.C.: The World Bank.

Milevsky, Moshe A. 2005. 'Real Longevity Insurance with a Deductible: Introduction to Advanced-Life Delayed Annuity (ALDA)', North American Actuarial Journal 9(4):109-122.

Milevsky, Moshe A. and Chris Robinson. 2000. 'Self-Annuitization and Ruin in Retirement', North American Actuarial Journal, Volume 4, Number 4.

Milevsky, Moshe A. and Virginia R. Young. 2002. 'Optimal Asset Allocation and the Real Option to Delay Annuitization: It's Not-Now-or-Never' Discussion paper PI-0211. London: The Pension Institute.

Mitchell, Olivia S., James M. Poterba, Mark J. Warshawsky and Jeffrey R. Brown. 2001. 'New Evidence on the Money's Worth of Individual Annuities', in Brown Jeffrey R., Olivia S. Mitchell, James M. Poterba and Mark J. Warshawsky, *The Role of Annuity Markets in Financing Retirement*, MIT Press, Cambridge, Massachusetts.

Palacios, Robert and Rafael Rofman. 2001. 'Annuity Markets and Benefit Design in Multipillar Pension Schemes: Experience and Lessons of Four Latin American Countries', Pension Reform Primer Paper No. 107. Washington, D.C.: The World Bank.

Palmer, Edward. 2008. 'The Market for Retirement Products in Sweden', Policy Research Working Paper No. 4748. Washington, D.C.: The World Bank.

Rocha, Roberto and Heinz Rudolph. 2010. 'A Summary and Update of 'Developing Annuities Markets: The Experience of Chile", mimeo. Washington, D.C.: The World Bank.

Rocha, Roberto and Craig Thorburn. 2007. *Developing Annuities Markets: The Experience of Chile*. Washington, D.C.: The World Bank.

Rocha, Roberto, Dimitri Vittas and Heinz Rudolph. 2010. 'The Payout Phase of Pension Systems: A Comparison of Five Countries', mimeo. Washington, D.C.: The World Bank.

Scott, Jason S., John G. Watson and Wei-Yin Hu. 2007. 'Efficient Annuitization: Optimal Strategies for Hedging Mortality Risk', PRC WP2007-09. Philadelphia: Pension Research Council.

Sigma. 2008. 'Innovative Ways of Financing Retirement'. Sigma No. 4/2008. Zurich: Swiss Re.

Valdes-Prieto, Salvador. 1998. 'Risks in Pensions and Annuities: Efficient Designs', Social Protection Discussion Paper Series 9804. Washington, D.C.: The World Bank.

Vittas, Dimitri. 2008. 'A Short Note on the ATP Fund of Denmark', Policy Research Working Paper No. 4505. Washington, D.C.: The World Bank.

Vittas, Dimitri, Gregorio Impavido and Ronan O'Connor. 2008. 'Upgrading the Investment Policy Framework of Public Pension Funds', Policy Research Working Paper No. 4499. Washington, D.C.: The World Bank.

Vittas, Dimitri, Heinz Rudolph and John Pollner. 2009. 'Designing the Payout Phase of Funded Pension Pillars in Transitioning European Countries', mimeo. Washington, D.C.: The World Bank.

Webb, Anthony, Guan Gong and Wei Sun. 2007. 'An Annuity People Might Actually Buy', Brief No. 7-10. Boston: Center for Retirement Research at Boston College.