

# The Mechanics and Regulation of Variable Payout Annuities

*Dimitri Vittas*

The World Bank  
Europe and Central Asia Region  
Private and Financial Sector Development Department  
and the Central Europe and the Baltics Department  
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## Abstract

This paper discusses the mechanics and regulation of participating and unit-linked variable payout annuities. These annuities offer benefits that are not fixed in either nominal or real terms but depend on the performance of the fund or funds in which the underlying reserve assets are invested, their profit sharing features, and the treatment of longevity risk.

The paper focuses on the treatment of investment and longevity risks by different types of these annuities and underscores the challenge of establishing a robust and effective framework of regulation and supervision for these products. The paper also addresses the exposure of annuitants to integrity risk and places special emphasis on the need for a high level of meaningful transparency.

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**Dimitri Vittas  
Consultant  
World Bank**

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## **Executive Summary**

The basic motivation for writing this paper stems from the realization that all retirement products have their strong points but also suffer from serious shortcomings. Hence, policymakers may well favor a combination of payout options, covering different products at a particular point in time as well as different payout options over time. Variable payout annuities, which offer benefits that are not fixed in either nominal or real terms but depend on investment performance, profit sharing rules, and the treatment of longevity risk, may play an important part in the retirement markets of some countries.

All types of retirement products have strong and weak points. Fixed real annuities protect against longevity, investment and inflation risks but require access to an ample supply of inflation-indexed securities, which is lacking in most middle and low income countries. For their part, fixed nominal annuities are exposed to inflation risk and thus fail to provide adequate protection, especially to long-lived individuals. In addition, fixed annuities, real or nominal, are exposed to annuitization risk, i.e., the risk of annuitizing at an inopportune time when financial markets are depressed and the cost of fixed annuities is high.

Variable payout annuities provide protection against longevity risk and allow for some participation in the higher (but more volatile) returns of corporate equities and other real assets. They also avoid the annuitization risk because their benefit payments vary with investment performance and are not fully determined by the prevailing conditions at the time of retirement. But VPAs are exposed to investment and inflation risks, are more complex to design and regulate than fixed annuities, and may suffer from much higher charges. They require a high level of integrity and meaningful transparency on the part of providers to ensure the fair treatment of annuitants and raise difficult regulatory and supervisory challenges, especially in countries where the financial and insurance markets are not well developed.

All types of life annuities, fixed as well as variable, suffer from two major shortcomings: they do not allow for bequests and they lack liquidity and flexibility. The latter is a major issue in view of the growing concern about the rising cost of long-term care. A recent paper found that the need to provide for long-term care is a crucial driver of precautionary savings, while the bequest motive is both strong and widely prevalent (Ameriks et al 2011). Term annuities and phased withdrawals avoid these last problems but do not protect against longevity risk.

VPAs vary by the presence or absence of guaranteed minimum benefits and by their treatment of investment and longevity risks. Six types of VPAs are discussed in this paper: traditional, escalating and PPM participating annuities; and standard, CREF and PPM unit-linked annuities (see Box 1 and section 2).

For all types of VPAs, the providers assume the investment and longevity risks for the guaranteed minimum benefits. For the non-guaranteed benefits, the annuitants either as a group or on a fund basis assume the investment risk, while the longevity risk is shared among annuitants, either as a pool or on an age cohort basis, except for the standard unit-linked annuities where it is assumed by the providers.

### **Box 1: Summary of VPA Features**

**Traditional participating annuities** offer guaranteed minimum benefits and discretionary bonuses that depend on investment performance and longevity experience. Providers allocate net investment results between shareholders and policyholders and use a smoothing mechanism for crediting bonuses in order to maintain stable bonus rates. In general, however, and despite their crucial role in determining the performance of these policies, both profit sharing rules and smoothing mechanisms suffer from a lack of transparency.

**Escalating participating annuities** offer guaranteed benefits that are targeted to grow at a stable rate and may thus be better able to maintain their value in real terms. Regular bonuses are guaranteed once they are declared. This is their main difference from traditional participating annuities. Otherwise, they suffer from the same issue of lack of transparency.

The **PPM traditional participating annuities** have two distinct features. They distribute 100 percent of the profits after deducting expenses; and they share the longevity risk among annuitants on an age cohort basis. Because they do not use a smoothing mechanism they are highly transparent, but annuity payments are more volatile than under the other types of participating annuities. The offer of guaranteed minimum benefits provides a floor to annuity payments.

The **standard unit-linked annuities** share the investment risk among annuitants on a fund basis but the longevity risk is assumed by the providers. A fixed charge for expenses and mortality risk is stipulated in the contract, while 100 percent of net income is distributed to annuitants. Providers are required to create a mortality fluctuation reserve to cover their exposure to longevity risk. The offer of guarantees is covered by fees that are included in the stipulated annual charge. Providers are required to incorporate in their reserves the need to cover their guarantees or to use appropriate hedging facilities for their risk exposure. These unit-linked annuities are generally highly transparent and do not suffer from the controversies afflicting participating annuities. However, their guaranteed benefits are more difficult to price and require access to efficient hedging facilities.

The **CREF unit-linked annuities** differ from the standard version in that both the investment and longevity risks are shared among annuitants on a fund basis. The providers are allowed to deduct from the gross investment income the actual expenses incurred as well as any charges for larger than expected increases in longevity. CREF annuities are not as transparent as standard unit-linked annuities or the PPM variety.

The **PPM unit-linked annuities** share both the investment and longevity risks among annuitants, the former on a fund basis and the latter on an age cohort basis. They are highly transparent, but as currently structured, they do not provide guaranteed minimum benefits. Annuity payments are therefore exposed to wide fluctuations.

VPAs also vary by the level of transparency of their profit sharing rules and smoothing mechanisms. The standard unit-linked annuities and the two PPM annuities are highly transparent, while the CREF annuities and the traditional and escalating participating annuities suffer from a lack of transparency. The assumption of investment and longevity risks for the guaranteed and non-guaranteed benefits and the level of transparency of different VPAs are summarized in Table 1.

**Table 1: Assumption of Investment and Longevity Risks**

	<b>Investment Risk</b>	<b>Longevity Risk</b>	<b>Profit Sharing &amp; Smoothing Mechanism</b>
<b>Guaranteed Benefits: All Types</b>	Providers	Providers	Not Relevant
<b>Non Guaranteed Benefits:</b>			
Traditional Participating	All Annuitants	All Annuitants	Non Transparent
Escalating Participating	All Annuitants	All Annuitants	Non Transparent
PPM Traditional Participating	All Annuitants	Age Cohorts	Transparent
Standard Unit-Linked	Annuitants by Fund	Providers	Transparent
CREF Unit-Linked	Annuitants by Fund	Annuitants by Fund	Non Transparent
PPM Unit-Linked	Annuitants by Fund	Age Cohorts	Transparent

Some VPAs, such as the PPM unit-linked annuities where annuitants select the funds in which their balances are invested and may opt for funds that specialize in high risk assets, are by construction high return/high risk products. Their exposure to investment risk is very high. Such products make sense when annuitants receive basic pension benefits from other sources that are adequate and secure so that an adverse outcome from their high-risk unit-linked annuities would not cause financial ruin in old age.

At the other end of the spectrum, escalating participating annuities invest predominantly in medium-term government and corporate bonds because they aim to declare bonuses that grow at a stable rate and are included in the guaranteed benefits once they are declared. Such annuities are exposed to moderate investment risk. Their returns are also likely to be moderate but their main attraction, in addition to the low exposure to investment risk, is that they avoid the annuitization risk of fixed annuities, provide better protection against inflation risk than fixed or escalating nominal annuities, and can replicate the benefits of fixed real annuities without requiring access to an ample supply of inflation-linked securities. Their main shortcoming is the use of opaque smoothing mechanisms and concomitant lack of meaningful transparency.

Of the six variants of VPAs, escalating participating annuities seem to be the most appropriate for the payout phase of mandatory pension pillars of middle-income countries that have the capacity to create a robust and effective regulatory and supervisory framework. The role of these annuities would be to complement a fixed real annuity provided by the public pillars one and/or



zero in most countries or by the private pillar if an adequate supply of inflation-protected instruments is available.

A detailed regulatory framework is essential in order to promote a fair treatment of annuitants, secure the long-term solvency of providers, and ensure that they operate with a high degree of integrity and meaningful transparency. These or any other VPAs would not be advisable for low and middle-income countries that lack the capacity to implement effective regulation and supervision.

The regulations should start by specifying the calculation of initial benefits. This would entail the setting of both the assumed investment rate of return (AIR) and the mortality tables. Ideally, the AIR should be set at a low level, but not excessively so. A rate close to the long-term real rate of interest would be appropriate. Since the longevity risk is shared among annuitants, it is not necessary to use highly conservative mortality tables that project large improvements in mortality. However, the mortality tables should be updated regularly and should allow for realistic expectations of mortality improvements. Unisex mortality tables should be used where this is required by law.

The computation of guaranteed benefits does not have to be made at the same AIR as the calculation of initial benefits. A lower rate, even zero percent, would be appropriate and could be combined with a more conservative mortality table. However, the guaranteed benefits should be adjusted for inflation and this should be taken into account in the computation of technical reserves.

Caps should be imposed on operating fees but they should allow for a reasonable rate of return on the equity capital of providers and should be reviewed regularly to prevent situations where the caps become the norm. Caps on operating fees should be lowered when justified by the scale of operations.

The regulations should specify a minimum rate of profit sharing to govern the distribution of net investment results, after deducting expenses and any charge for larger than expected increases in longevity, between policyholders and shareholders. An acceptable smoothing mechanism should also be adopted to apportion in a more transparent manner the profits allocated to policyholders between regular bonuses credited to policyholders and profits added to the collective bonus reserve. The smoothing mechanism should take into account the need to maintain stable bonus rates that aim to preserve the real value of guaranteed benefits and should specify the upper and lower bounds for regular bonus payments and for additions to the collective bonus reserve.

Reserving policies should take fully into account the rising guaranteed benefits. These should be based on gender-specific mortality tables and should be discounted by using market-based maturity-dependent discount rates. An appropriate yield curve specified by the regulators should be used by all providers. The reserves should be equal to the higher of the value of annuity assets and the present value of guaranteed benefits. In cases of provider insolvency, government guarantees should cover the payment of guaranteed benefits up to specified reasonable levels.

Caps should be imposed on both broker commissions and surrender charges. Switching of annuity providers could be permitted, but if this is allowed, rules should specify the valuation of portable balances, which should also include a fair share of the collective bonus reserve. Transfer fees should also be regulated. When switching is allowed, special measures should be adopted to protect persons of advanced age from hard-selling practices.

The marketing of VPAs should be subject to the usual conduct rules. However, to promote greater transparency and facilitate comparability, a centralized database with detailed data on profit-sharing policies, operating fees, and long-term performance should be maintained and be easily accessible.

When regulating the offer of complex products it is important to have clear rules on all aspects of the products concerned. Any gaps in regulations would undermine their effectiveness. As experience with the offer of these products is gained, the regulations could be relaxed, provided there is an adequate degree of effective competition.

A more flexible regulatory regime would rely on greater transparency and clear principles of cost allocation and profit sharing between annuitants and shareholders. The flexible regulation that is followed in Denmark would merit consideration. It allows annuity providers to determine their initial benefit payments and their own profit distribution policies and smoothing mechanisms but requires a high level of meaningful transparency.

The case for centralized provision, along the lines of the Swedish PPM or the Danish ATP, should be considered when decentralized markets become highly oligopolistic. However, a centralized solution should not be envisaged unless public institutions operate with a high level of transparency and a sound governance structure. Such governance structures, autonomy and transparent reporting are needed ingredients for centralized systems to be immune from political interference.

For countries where the creation of a robust regulatory framework is a major challenge, the authorities might prefer to authorize the offer of fixed real annuities or, in their absence, escalating nominal annuities in combination with either phased withdrawals or unit-linked annuities without any guarantees.

Under this approach, retiring workers could be allowed to invest between 70 and 100 percent of their account balance in either a fixed real annuity or an escalating nominal annuity with annual benefits increasing at a specified rate (say, 2 percent). This would provide a guaranteed income with total or some protection against inflation.

To mitigate annuitization risk, i.e., the risk that at the time of retirement asset prices and/or long-term rates of interest are abnormally low, allowing annuities to be purchased on an instalment basis over a period of five to ten years could be considered.

At the same time, retiring workers could be allowed to invest up to 30 percent of their balances in a phased withdrawal account or unit-linked annuity without any guarantees. They could invest these balances in a small number of underlying funds of their choice. This combination would

probably achieve as good results as the offer of escalating participating annuities, provided of course that there is an adequate presence of well managed and regulated investment funds.

The 70/30 threshold is indicative. Individual countries may opt for a higher or lower level, depending on the availability and level of a basic public pension. If the public pension is significant, a much higher proportion of balances than the 30 percent level suggested above could be allowed to be invested in unit-linked annuities.

This paper draws a clear distinction between variable payout annuities (VPAs) that provide retirement income for life, and the US-style variable annuities with various guarantees that are effectively investment products with an option to annuitize. A relatively recent innovation of the latter, the lifetime guaranteed minimum withdrawal benefit (LGMWB), represents an interesting compromise between the conflicting objectives of longevity insurance with income security, on the one hand, and the demand for investment flexibility with long-run potential and the bequest motive, on the other.

However, the offer of such guarantees presupposes effective access not only to well-developed financial markets but also to liquid and efficient hedging facilities. Absent such access, it would be inappropriate to authorize their use among the payout options of a mandatory pension pillar.

# 1. Introduction

## 1.1 Regulatory Challenge<sup>1</sup>

This paper discusses the mechanics and regulation of participating and unit-linked variable payout annuities (VPAs). These annuities offer benefits that are not fixed in either nominal or real terms but depend on the performance of the fund or funds in which the underlying reserve assets are invested, their profit sharing features, and the treatment of longevity risk.

The basic motivation for writing the paper stems from the realization that all retirement products have their strong points but also suffer from serious shortcomings. Hence, policymakers may well favor a combination of payout options, covering different products at a particular point in time as well as different payout options over time.<sup>2</sup> Variable payout annuities may play an important part in the retirement markets of some countries.

All types of retirement products have strong and weak points. Fixed real annuities protect against longevity, investment and inflation risks but require access to an ample supply of inflation-indexed securities, issued by both the public and private sectors, to enable providers to hedge their risks in an economically effective way.<sup>3</sup> Absent such hedging instruments, the cost of providing fixed real annuities would be prohibitively high. For their part, fixed nominal annuities provide protection against longevity and investment risks but are exposed to inflation risk and thus fail to provide adequate protection, especially to long-lived individuals. In addition, fixed annuities, real or nominal, are exposed to annuitization risk, i.e., the risk of annuitizing at an inopportune time when financial markets are depressed and the cost of fixed annuities is high.

Variable participating and unit-linked annuities have their own advantages and shortcomings. They protect against longevity risk and allow for some participation in the higher (and more volatile) returns of corporate equities and other real assets. As a result, they offer greater flexibility and potential for higher benefits. They also avoid the annuitization risk because their benefit payments vary with investment performance and are not fully determined by the prevailing conditions at the time of retirement. But VPAs are exposed to investment and inflation risks, are more complex to design and regulate than fixed annuities, and may suffer from much higher charges. They require a high level of integrity and meaningful transparency on the part of providers to ensure the fair treatment of annuitants and raise difficult regulatory and supervisory

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<sup>1</sup> In preparing this paper I benefited from extensive comments offered by Mark Fowler, actuary consultant, and from the assistance of Lars Billberg, Chief Actuary of the Swedish Pensions Agency, who provided detailed data and commentary on the operational aspects of PPM annuities. I am also indebted to John Ashcroft, Gregorio Impavido, Estelle James, Don McIsaac, Moshe Milevsky, John Pollner, Roberto Rocha, Heinz Rudolph, and Anita Schwarz for their insightful comments. Officials of several European regulatory agencies clarified some points of detail, while a group of actuaries linked to the International Actuarial Association provided some very helpful comments. The usual disclaimer applies.

<sup>2</sup> This point is underscored in Rocha and Vitas (2010), a paper that addresses the policy issues, constraints and options in designing the payout phase of pension systems.

<sup>3</sup> Over the past few decades many OECD countries have expanded the supply of inflation-protected government bonds but Chile is a rare exception of a country where private sector long-term corporate and mortgage bonds are also linked to inflation.

challenges, especially in countries where the financial and insurance markets are not well developed.

All types of life annuities, fixed as well as variable, suffer from two major shortcomings: they do not allow for bequests and they lack liquidity and flexibility. The latter is a major issue in view of the growing concern about the rising cost of long-term care. A recent paper found that the need to provide for long-term care is a crucial driver of precautionary savings while the bequest motive is both strong and widely prevalent (Ameriks et al 2011). Term annuities and phased withdrawals avoid these last problems but do not protect against longevity risk.

The offer of variable payout annuities raises several key questions. Under what conditions should participating and unit-linked annuities be authorized? What are the regulatory challenges and how can they be overcome? Should developing countries authorize their offer or would they be better off promoting the use of fixed real annuities or, in their absence, escalating nominal annuities? Which types of participating or unit-linked annuities should they favor?

Many middle-income countries, especially in Central and Eastern Europe, aspire to establish robust and effective regulatory systems for the payout phase of their mandatory funded pension pillars.<sup>4</sup> Several of these countries currently face severe budgetary pressures and are engaged in policy reversals, ranging from reducing or even suspending contributions to their funded pillars to transferring all assets back to the public pillar. These measures will limit the growth of supplementary pension pillars and will delay the emergence of active markets for retirement products. In the longer run, however, when the budgetary problems are resolved, the funded second pillars are likely to resume their growth. Policymakers will then need to revisit the design of the payout phase, address the role that participating and unit-linked annuities may play in the new system, and confront the challenge of creating appropriately robust regulatory systems.

## **1.2. Definition of Variable Payout Annuities (VPAs)**

In a strict sense, a variable payout annuity is any annuity that is not fixed in money terms. Under this definition, escalating nominal annuities, inflation-indexed annuities, participating (also known as with-profits) annuities, and unit-linked (also known as market-linked, investment-linked or fund-linked) annuities would all be classified as VPAs.

However, neither escalating nominal nor inflation-indexed annuities are usually treated as variable payout annuities. This is because annual payouts in escalating nominal annuities increase at a pre-determined rate and the value of future payments is known at the time of purchase, while inflation-indexed annuities vary at the rate of inflation and their payments are effectively fixed in real terms.

Participating annuities usually involve a guaranteed benefit and also distribute a bonus depending on the performance of the fund operated by the provider.<sup>5</sup> In contrast, in unit-linked

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<sup>4</sup> Vittas et al (2010) discuss the design of the payout phase in several Central and Eastern European countries.

<sup>5</sup> It is not clear when participating annuities were first introduced. Participating life insurance policies have their origin in mutual insurance companies in the United Kingdom in the early part of the 19th century. These companies applied very high mortality rates on their policies at that time and distributed excess profits to their members by increasing benefits (Haberman et al, 2003). Participating annuities probably emerged in the latter part of the 19th or

annuities that do not offer any guarantees, annual benefits fluctuate with the performance of one or more funds operated either by the annuity provider or by independent asset managers but selected by individual annuitants.

A distinct feature of variable annuities is that depending on the composition of their asset portfolios, they may be exposed to significant investment risk. As a result, annual benefits may not just vary from year to year but may experience wide fluctuations, depending on the terms of the contracts, including the offer of guaranteed minimum benefits. However, another distinguishing feature is the treatment of longevity risk. In some contracts, this is borne by the providers, while in others it is shared among annuitants.

In the United States variable annuities are extensively used during the accumulation stage in order to benefit from the tax advantages bestowed on them. These are in fact unit-linked investment products that are offered with a wide range of optional guarantees, covering minimum death, accumulation, income and withdrawal benefits. They also include an option to annuitize, although this is rarely exercised. For this reason, the term 'variable payout annuities' (VPAs) has been coined and is widely used to differentiate them from mere variable annuities that are not annuitized. They are also known as 'variable income annuities' (Dellinger 2006).

In recent years, variable annuities, similar to those offered in the United States, have been introduced in Canada,<sup>6</sup> Asia and Europe. In some European countries, mainly because of their wide range of guarantees, variable annuities are perceived as different products from unit-linked annuities, which have been offered in some countries for more than two decades.<sup>7</sup>

### **1.3 The Purpose and Structure of the Paper**

This paper focuses on the treatment of investment and longevity risks by different types of participating and unit-linked annuities and underscores the challenge of establishing a robust and effective framework of regulation and supervision for these products. Special emphasis is placed on the need for a high level of meaningful transparency.

The paper also addresses the exposure of annuitants to integrity risk, which is in some respects similar to bankruptcy risk, although it varies from it in two significant aspects: it does not imply the failure and closure of the annuity provider concerned; and its adverse effects may be undetected for a prolonged period. The paper includes a brief description of US-style variable annuities but does not contain a detailed discussion of their more complex risk management and regulatory issues.

The structure of the paper is as follows. The next section presents the basic mechanics of the main types of participating and unit-linked annuities. Section 3 sets out the main advantages and

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the beginning of the 20th century. Unit-linked annuities started to be offered in the United States in the 1960s and spread to other high income countries over the ensuing decades.

<sup>6</sup> Milevsky (2002) noted that VAs were not available in Canada in the past but were recently introduced (late 1990s?) within registered retirement savings plans. A more recent paper reviews the vast expansion of variable annuities in the Canadian market (Milevsky and Shao 2010).

<sup>7</sup> A recent consultation paper by CEIOPS (Committee of European Insurance and Occupational Pension Supervisors), now EIOPA (European Insurance and Occupational Pension Authority), confirms this perception (CEIOPS 2010).

disadvantages of variable payout annuities relative to other retirement products and discusses in greater detail their exposure to investment risk. The ensuing sections address several regulatory issues. Sections 4 and 5 discuss the regulation of pricing and reserving policies, first for participating and then for unit-linked annuities. Section 6 focuses on the regulation of marketing policies, while section 7 covers the regulation of market structure, the prudential regulation of annuity providers, and the offer of government guarantees. All these regulatory issues are broadly similar for both types of annuities.

The paper also has 3 annexes. The first presents the derivation of the basic formula for setting annual payments in unit-linked annuities. The second focuses on the detailed mechanics and performance of the two PPM annuities operated by the Swedish Pensions Agency (SPA). And the third contains a brief discussion of the types of benefit guarantees offered by US-style variable annuities and highlights the challenging regulatory issues raised by these products.

## **2. The Mechanics of the Main Types of VPAs**

### **2.1 Main Types of VPAs**

Like fixed annuities, variable payout annuities (VPAs), whether participating or unit-linked, come in several variants, such as single or multiple premium, joint or single life, immediate or deferred, with guaranteed periods of payment or not. They also vary by the presence or absence of guaranteed minimum benefits and by their treatment of investment and longevity risks. Six types of annuities are discussed below:

- i. Traditional participating annuities;
- ii. Escalating participating annuities;
- iii. PPM traditional participating annuities;
- iv. Standard unit-linked annuities;
- v. CREF unit-linked annuities; and
- vi. PPM unit-linked annuities.

**Traditional participating annuities** offer guaranteed minimum benefits and discretionary bonuses that depend on the investment performance of the funds and the longevity experience of the pool of annuitants. These policies have been widely offered in European countries, where they have effectively been the mirror image of participating endowment life insurance policies. The providers assume both the investment and longevity risks for the guaranteed benefits, but these risks are shared among annuitants for the discretionary bonuses. The reserves are invested in funds managed by the providers. The profits are determined after the deduction of expenses and any charges for larger than expected increases in longevity. The profits are then distributed between policyholders and shareholders at the discretion of the providers but following some basic rules. In order to maintain reasonably stable bonus rates, providers use a smoothing mechanism for crediting bonuses to policyholders. This involves the creation of a collective bonus reserve (also known as unallocated bonus reserve). In general, and despite their crucial role in determining the performance of these policies, both profit sharing rules and smoothing mechanisms have suffered from a lack of transparency.

Over time, traditional participating annuities have evolved into **escalating participating annuities**. A basic objective of these products is to offer guaranteed benefits that are targeted to grow at a stable rate and may thus be better able to maintain their value in real terms. The bonuses are calculated at a rate that aims to cover moderate inflation, are declared annually, and are then included in future guaranteed minimum benefits. However, the bonuses are not guaranteed before their declaration and may be suspended if financial performance is very weak, although providers adopt investment and bonus distribution policies that favor stable and predictable bonus policies. From time to time bonuses may reflect exceptional profits that may not be incorporated in the guaranteed benefits for future years. Escalating participating annuities are widely used in continental European countries, especially in Germany (where they are called dynamic participating annuities) and Denmark.<sup>8</sup>

In Sweden, the traditional participating annuities offered by the Swedish Pensions Agency for the funded component of the public pension system have two distinct features. The provider assumes the investment and longevity risks for the guaranteed minimum payments, but for the nonguaranteed benefits, while the investment risk is borne by all annuitants, the longevity risk is shared among annuitants on an age cohort basis. In addition, the SPA does not use a smoothing mechanism but distributes 100 percent of the profits after deducting expenses, thus making them highly transparent. These are referred to in this paper as the **PPM traditional participating annuities** because when they were first offered the agency responsible for the management of the funded component of the public pension system was known as the PPM (*Premiepensionsmyndigheten* – or Premium Pension Authority).<sup>9</sup>

The basic characteristic of the **standard unit-linked annuities** is that the investment risk is shared among annuitants but the longevity risk is assumed by the providers. A fixed charge for expenses and mortality risk is stipulated in the contract, while 100 percent of net income is distributed to annuitants. Unit-linked annuities are highly transparent and do not suffer from the controversies afflicting participating annuities. These annuities have been authorized throughout the United States and have over time evolved into the VAs (and VPAs) with guaranteed benefits. The providers assume both the longevity and investment risks for the guaranteed benefits. Standard unit-linked VPAs have been offered in many European and other countries for the past quarter of a century but the new US-style variable annuities were more recently introduced in several countries outside the United States.

**CREF unit-linked annuities** differ from the standard version in that both the investment and longevity risks are shared among annuitants, the latter reflecting the longevity experience of the pool of annuitants of each fund. Their name derives from the special contract that has been authorized in New York for the TIAA-CREF, an insurance and pension institution that has specialized in offering retirement products to staff in academic institutions.<sup>10</sup> CREF annuities

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<sup>8</sup> The German annuity market is examined in von Gaudecker and Weber (2004) and Kaschutzke and Maurer (2010), while the Danish market is discussed in Andersen and Skjodt (2007).

<sup>9</sup> The PPM was created in 1994 but was merged into the Swedish Pensions Agency (SPA) in 2010. In addition to the participating annuity, a unit-linked product is also offered (see below and Annex B for more details).

<sup>10</sup> Over the years, the scope of operations of the TIAA-CREF has expanded and now covers people working in the academic, medical, cultural and research fields. In addition, the status of the TIAA CREF has changed into that of a 'for-profit' institution offering products and services to the whole market and it is not clear how its policies and products will evolve in the future.



have not been authorized in either Canada or the United Kingdom. The unit-linked annuities that have been introduced in continental Europe in the 1980s and 1990s appear to share the longevity risk among the whole pool of annuitants, i.e., they seem to follow the CREF approach in the United States, although the legal basis is not very clear.<sup>11</sup>

In the **PPM unit-linked annuities**, the investment risk is borne by the annuitants on the basis of the performance of the fund (or funds) selected by them, while the longevity risk is shared among annuitants on an age cohort basis. This is their basic difference with CREF annuities where the longevity risk is shared among all annuitants. No guaranteed minimum benefits are currently offered by the SPA for its unit-linked annuities.

In all cases of variable payout annuities, providers are required to maintain reserves in segregated accounts and are not allowed to mix them with the general reserves they hold for the various types of fixed annuities.

## **2.2 Calculation of Initial Benefit Payments**

All types of VPAs follow the same approach in setting the initial benefit payments. The net capital premium, i.e., the gross premium less any upfront charges, is divided by an appropriate annuity factor. This in turn is calculated by using an assumed investment rate of return (AIR) and an appropriate mortality table.<sup>12</sup>

Annuity providers set the AIR at a rate that is close to market levels and may also reflect the investment objective of the annuity. The regulators may impose an upper limit on the permissible level for the AIR.

Annuity providers in Canada and the United States allow annuitants to select their own AIR from within a specified range. In Canada, this varies between 3 and 8 percent (Milevsky 2002), although no cap is imposed by the regulators, while in the United States the common range is between 3 and 5 percent, but it may reach 7 percent with approval from the state insurance commissioner (Dellinger 2006).

For any given path of investment returns, a low AIR results in a relatively low level of initial benefit payments compensated by relatively much higher payments in later years and vice versa in the case of a high AIR. This pattern raises the question of potential self selection. People who have impaired health and a shorter than average life expectancy or who underestimate their expected longevity may prefer a higher AIR and thus higher initial payments, while people who have a longer than average life expectancy may opt for a lower AIR.

In the United States, market practitioners suggest that providers do not use different mortality tables for different AIRs. They generally adopt more conservative mortality assumptions for all VPAs relative to fixed annuities, mainly because they lack the ability to use conservative

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<sup>11</sup> The participating 'guarantee and bonus' annuities that are used extensively in Denmark are often organized as deferred group annuities and resemble escalating participating annuities. Recent years have seen a large increase in unit-linked policies but according to the regulatory authority these are used during the accumulation stage and convert to the traditional participating annuities at retirement.

<sup>12</sup> The mechanics of participating annuities are also discussed in Fowler (2010).

investment assumptions to offset any under-estimation of longevity. One possible explanation for the lack of concern about potential adverse selection may well be the relatively low volume of VPA business. If demand for VPAs, i.e., if use of the annuitization option, were to increase to represent a large part of the business of providers, it is likely that policies would be adopted to prevent exposure to the adverse effects of self selection.

A low AIR implies relatively low initial payments but allows future payments to keep pace with inflation. Thus, a variable payout annuity with a low AIR may achieve the same objective as a fixed escalating annuity. This implies that the AIR should be close to the long-term real rate of interest. An AIR that is significantly lower than this level would create distortions in the pattern of real (i.e., inflation-adjusted) benefit payments among annuitants with different longevity prospects, favoring long-lived individuals at the expense of short-lived ones.

The choice of mortality table is a thorny issue in all types of annuity products. In general, annuity providers adopt conservative assumptions by factoring in projected improvements in mortality. They have a stronger incentive for this in contracts where they assume the longevity risk. It is notable that the Swedish Pensions Agency in Sweden uses a significantly more conservative mortality table for the calculation of the guaranteed benefits of the PPM participating annuities than it does for the benefit payments of both the unit-linked annuities and the regular payments of the participating annuities.

## 2.3 The Setting of Benefit Payments in Subsequent Years

Differences arise among the different types of annuities in the setting of subsequent benefit payments. Starting with the simpler and more transparent case, the **standard unit-linked VPA**, the annual payment in year  $t$  is equal to the annual payment in the preceding year  $(t-1)$  multiplied by the ratio of  $(1+RIR)_{(t-1)}/(1+AIR)$ .<sup>13</sup> The RIR (the realized investment rate of return by the relevant fund or funds)<sup>14</sup> is determined after deducting from gross investment income the charge for expenses and longevity risk. The charge is stipulated in the contract and providers are not allowed to increase it over the life of each unit-linked contract.<sup>15</sup> Providers are required to create a mortality fluctuation reserve and to make transfers from surplus to ensure its adequacy when longevity assumptions are exceeded. They are of course free to make transfers in the opposite direction when assumptions are overstated. Any overrun (or under-estimation) of expenses affects the profits of providers. If they are offered with guaranteed minimum rates of return or guaranteed minimum benefits, then these would be used to determine the annual benefit payments. The offer of guarantees is covered by fees that are included in the stipulated annual charge. Providers are required to incorporate in their reserves the need to cover their guarantees or to use appropriate hedging facilities for their risk exposure.

The same approach in setting annual payments in subsequent years is also followed in **CREF unit-linked annuities**, but with one major difference. In CREF annuities the providers do not make a stipulated annual charge for expenses and longevity risk but are allowed to deduct from the gross investment income the actual expenses incurred in administering the contract as well as

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<sup>13</sup> The derivation of this simple formula is shown in Annex A.

<sup>14</sup> The RIR is the realized investment return by the relevant fund. It is not the market investment rate of return, which is given by the average return of all funds in the market.

<sup>15</sup> The charge for expenses and longevity risk may vary depending on the level of the AIR.

regular adjustments for changes in longevity. The longevity adjustments are based on periodic estimates of longevity changes in the pool of annuitants that use a particular fund (relative to the longevity expectations factored in the setting of the initial benefit payments). Except for any guaranteed benefits, the providers do not bear the longevity risk, which is shared among all annuitants. The charges for expenses and longevity vary from year to year, affecting the net RIR and annuity payments. The providers are effectively allowed to make transfers from investment income to reserves to reflect changes in longevity. The CREF annuity represents an interesting approach to the treatment of longevity risk but it is notable that neither Canada nor the United Kingdom has authorized this type of annuity.

The **traditional participating annuities** that are found in continental Europe follow a broadly similar approach. These policies are usually offered with guaranteed minimum benefits and declare annual bonuses based on the results of investment performance and longevity experience. A key variable for these policies is the profit sharing rule, which allocates annual profits between shareholders and policyholders. Once the profit allocated to policyholders is determined, it is used to calculate the bonus rate that is credited to policyholders and the share of profits that is placed in the collective bonus reserve. A smoothing mechanism is normally used in order to avoid wide fluctuations in the level of annual bonuses, but these mechanisms lack transparency and generate concerns about the equity and appropriateness of the bonus crediting policies of different providers.

**Escalating participating annuities** aim to pay bonuses that increase at a more or less stable rate and incorporate such bonuses in the guaranteed benefits once they are declared. The initial payments are lower in these policies and the bonus rate is determined by taking into account the net investment performance and longevity experience of the fund as well as the need to build adequate reserves to enable the payment of rising guaranteed benefits. Annual bonuses may be suspended if net performance is very weak and threatens to undermine the adequacy of reserves. Such policies aim to replicate the benefits paid by fixed real annuities but without committing to do so. Because of this, they do not need to have access to an ample supply of inflation-linked securities.

The **PPM unit-linked annuities** follow a different approach in calculating subsequent annual benefit payments. The Swedish Pensions Agency maintains individual accounts that record changes in account balances. The end-of-year (EOY) balance in any one year is equal to the beginning-of-year (BOY) balance less the benefit payments made during the year, plus investment income, less operating fees, plus survival credits. Survival credits in any one year are determined by multiplying the average account balance during the year (which is given by the BOY balance less half the benefit payments during the year) by the economic mortality risk for the year<sup>16</sup>. Survival credits are given by the remaining balances in the accounts of deceased annuitants in any one year and for each age cohort. The BOY balance in the following year is divided by the new appropriate annuity factor to determine the annual benefits for that year. The annuity factor is based on the AIR, which may change from year to year, and expected mortality. The use of expected mortality protects pensioners in advanced ages from the declining cell numbers, while the small number of survivors does not affect the soundness of the program.

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<sup>16</sup> Half the annual benefits is taken into account because payments are made on a monthly basis.

The posting of survival credits on individual accounts plays a crucial role in ensuring that the longevity risk is shared among annuitants on a cohort basis. Without them, PPM annuities would be similar to the lifetime phased withdrawals that have been authorized in Chile and other countries. A special feature of the PPM unit-linked annuities is that asset management is decentralized. Balances are allocated by annuitants to authorized investment funds (see Annex B).

**The PPM traditional participating annuities** follow a similar approach as the unit-linked annuities, except that they also offer guaranteed minimum benefits and all balances are invested in one or more funds selected by the Swedish Pensions Agency. When the guarantees are activated, the minimum benefits are deducted from the accounts of the annuitants, which implies that annuitants pay for the guarantees with their own funds. When the balances are exhausted, the SPA assumes responsibility for paying the guaranteed benefits from its own funds. In computing the guaranteed minimum benefits, the SPA uses a lower interest rate than the AIR used for calculating the level of annual payments and also applies a more conservative mortality table. A weakness of this product as currently applied in Sweden is that the guaranteed minimum benefits are not adjusted for inflation.<sup>17</sup> The SPA creates reserves to cover its liability for the guaranteed benefits.

### **3. Advantages and Disadvantages of VPAs**

#### **3.1 Advantages of VPAs**

VPAs have several advantages over other types of annuities. First and foremost, they allow participation in the normally higher, but more volatile, returns of equities and real assets. In contrast, fixed real and nominal annuities are limited to the returns attainable in long-term bond or bond-like instruments.<sup>18</sup>

Second, VPAs avoid the 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. The timing of annuitization is a major concern for all types of fixed annuities. But in the case of VPAs, annuity payments vary with the performance of annuity funds and thus the prevailing conditions at the time of retirement do not have long-term implications.

Third, buyers of VPAs may not suffer from the wide dispersion of annuity prices that characterize fixed annuities. Evidence from the United Kingdom shows that the range of quoted

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<sup>17</sup> The mechanics and performance of the two types of annuities offered by the PPM are discussed in much greater detail in Annex B.

<sup>18</sup> It is strongly argued by many financial economists and actuaries that despite the historical persistence of a sizable equity premium, risk-adjusted returns on equities are no higher than those on bonds. This argument is based on the postulate that the observed equity premium reflects the higher risk of equity returns. However, the equity premium may embody not only higher risk but also productivity gains of investments in real assets. This implies that the risk-adjusted returns on equities are higher than those on bonds, although not as high as the observed equity premium. It is also often argued that both the equity premium and the apparent mean or trend reversion of equity returns may reflect a survival bias for markets that are able to recover from major crises. Survival bias is clearly an important consideration. However, it does not favor investments in corporate or even government bonds because in countries where equity markets collapse and fail to recover or do so with a long and uncertain time lag, bond markets fare much worse.

prices for fixed annuities may exceed 20 percent of average prices (Rocha and Vittas, 2010), while data on sold annuities in Chile point to similar conclusions (Rocha and Thorburn, 2007).

Fourth, VPAs that share longevity risk among annuitants allow for a more balanced treatment of longevity risk because they do not have to rely on overly conservative assumptions about projected future mortality improvements. Longevity risk-sharing VPAs provide full protection against diversifiable longevity risk, i.e., the risk that any one annuitant may live much longer than the average, but share among surviving annuitants the non-diversifiable risk, i.e., any increase in average longevity.

Fifth, to the extent that providers do not assume the longevity, investment and inflation risks, VPAs imply smaller capital requirements for provider solvency and thus lower the cost of annuities.

### **3.2 Disadvantages of VPAs**

But VPAs also suffer from several shortcomings. Unlike holders of fixed real annuities, who are protected against longevity, investment and inflation risks, buyers of VPAs are exposed to investment and inflation risks and share the non-diversifiable component of longevity risk.

Second, depending on how the initial calculation of annual payments is made, they may start with relatively low payments. This depends on the level of the AIR relative to the level of market returns and the extent of projected mortality improvements that have been retained in the longevity assumptions.

Third, depending on the volatility of annual returns on investment funds, annuity payments may fluctuate widely from year to year. These fluctuations may cause large changes in the consumption patterns of pensioners.

Fourth, VPAs presuppose access to well functioning and liquid securities markets. If they offer extensive guarantees, they also require access to efficient hedging facilities.

Fifth, buyers of VPAs avoid the price dispersion of fixed annuities but they are exposed to the potential dispersion of investment performance, expense levels and bonus smoothing mechanisms.

Sixth, VPAs suffer from more complex charges that are both less transparent and more difficult to understand. Consumers often rely on the advice of brokers who have incentives to direct them to products and providers that offer the highest commissions. These create conflicts of interest situations, especially in markets where conduct regulation and supervision are weak.

Seventh, VPAs may also suffer from opportunistic cost transfer pricing and profit sharing policies. Because they are less transparent and are more difficult to compare than fixed annuities, such practices may proliferate.

Eighth, because of the way they handle longevity risk, some VPAs are exposed to potentially deceptive and even perverse marketing policies, affecting their risk-sharing arrangements.

Ninth, VPAs require a very robust and effective system of regulation and supervision with high levels of transparency and integrity. Regulation and supervision should cover both prudential and conduct issues. Preventing opportunistic and deceptive practices is a difficult challenge.

### **3.3 Exposure to Investment Risk**

Exposure to investment risk is real but its impact is often exaggerated. The risk of large losses and even financial ruin is present when annuity reserves are heavily invested in high-risk assets. A large and prolonged decline of asset prices may cause an early depletion of VPA balances.

However, this risk is mitigated by the mean (or rather trend) reverting pattern of asset returns and the dollar cost averaging process of long-term retirement saving, especially when the latter applies to both its accumulation and decumulation phases. This is because accumulated balances are likely to be very high at the end of a prolonged strong performance of equities. While the probability of a prolonged decline in equity prices will then be high, accumulated balances will be better able to sustain the impact of falling prices without suffering catastrophic erosion. Admittedly, mean or trend reversion does not occur with precise regularity and balances may suffer a significant decline before asset prices recover, but allowing for the dollar cost averaging process the probability of financial ruin is much smaller than is often argued.<sup>19</sup>

Exposure to investment risk can be further mitigated by investing in more stable asset allocations, although these would imply a lower expected return than in an all-equity portfolio. Since workers retiring at 65 have an average life expectancy of around 20 years and many will have a much longer retirement life, they may benefit from the higher returns of VPAs that have larger allocations in equities and real assets provided they have the required level of risk tolerance.

Investment risk can also be contained by the offer of guaranteed minimum benefits and the use of floors and caps on asset returns. These entail a tradeoff between risk and return and their use should reflect the preferences and risk tolerance of annuitants. Although guarantees promise a more optimal combination of asset returns with adequate protection, they are difficult to price and even more difficult to regulate. Pensioners may be better off using a combination of fixed real annuities (if available) and VPAs without guarantees than purchasing VPAs with guarantees.<sup>20</sup>

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<sup>19</sup> The argument that dollar cost averaging reduces the risk of long-term investments suffers from the fallacy of time diversification. Any investment, whether in lump sum or installment form that has a given target date for its realization is exposed to the risk that market prices may be low at the target date. However, the risk exposure is different if both the accumulation and decumulation of retirement savings follows the dollar cost averaging process. Under such an approach, retirement saving is the very definition of time diversification. There is nothing fallacious about it. Of course, if retiring workers intend to use all or a large part of their accumulated savings to purchase fixed nominal or real annuities, they would be exposed to the risk of annuitization discussed above. They would then need to adopt policies to mitigate this risk, especially by following lifecycle investing strategies (e.g., increasing their allocations into long-term bonds, or purchasing annuities on an installment basis, as they near retirement).

<sup>20</sup> If fixed real annuities are not available, retiring workers can use a combination of escalating nominal annuities and VPAs without guarantees.

A major concern is that annuity payments may fluctuate widely from year to year, causing large changes in the annual consumption patterns of retirees. However, most pensioners are not forced and are not likely to spend all their increased income when annuity payments are higher than average. Some of their increased retirement income may be saved and their consumption patterns may well prove to be more stable than their income. Another option used by providers in some countries is to allow annuitants, if they so wish, to withdraw smaller amounts in individual years.

The exposure to investment risk and its potential adverse effects is a very strong argument against total reliance on VPAs. However, the presence of various mitigating factors suggests that they could be considered as part of a combination of payout options, especially in countries that can effectively address their regulatory and supervisory challenges.

## **4. Pricing and Reserving Policies of Participating Annuities**

This section discusses the regulation of pricing and reserving policies for the main types of participating annuities. The discussion focuses on the need for fair pricing policies that allow retiring workers to make informed decisions and are free from deceptive offers that exploit the lack of familiarity of workers with these complex products. (Section 6 on the regulation of marketing policies revisits the issue of deceptive practices.) The section addresses the case for regulating the various pricing features of different products and the burden that excessive regulation may place on market competition and product innovation. It also covers the regulation of reserving policies for these annuities with a view to ensuring the adequacy of technical reserves and the long-term financial soundness of providers. Two main principles are underscored: the need to protect the security of the retirement income of pensioners and the need to treat pensioners fairly.

### **4.1 The Regulation of Pricing Policies of Traditional and Escalating Participating Annuities**

The regulation of pricing policies of traditional and escalating participating VPAs raises many complex issues and is particularly challenging in a competitive decentralized market. Strong competition among providers may lead to high initial payments that are then followed by low bonuses. To protect annuitants and avoid unstable situations, a cap is usually applied to the maximum AIR that can be used, even in countries that do not rely on quantitative restrictions. However, this practice is not universal; neither Canada nor the United Kingdom apply such a cap.

In countries with less developed insurance markets, policymakers may well be inclined, even advised, to specify the calculation of initial benefit payments. This approach was proposed in Hungary in the 2009 stalled law on the design of the payout phase of the pension system. The proposal was motivated by the underdevelopment of insurance and annuity markets and the lack of familiarity of retiring workers with annuity products. Regulating the calculation of initial payments involves the stipulation of AIRs and mortality tables but also requires some rules on commission levels, surrender and operating charges, and profit participation rates.

**Setting the AIR.** Countries that wish to regulate the calculation of initial benefit payments are inclined to stipulate low levels of AIRs for three main reasons: to allow for higher payments in

later years and thus to make it easier for benefit payments to keep pace with inflation; to avoid situations where fluctuations in market rates cause frequent changes in regulated AIRs; and to set guaranteed benefits at a low level.

The first two reasons have some validity, although care should be taken to avoid very low AIRs that cause significant distortions in the time pattern of benefit payments. In this respect, the stipulated zero percent AIR, which was proposed in the stalled Hungarian law of 2009, was probably overly restrictive (Vittas et al 2010). In general, a regulated AIR that is close to the long-term real rate of interest will probably be appropriate for calculating initial benefit payments and will allow sufficient room for future bonuses to cover the need for inflationary adjustments. In most countries, this should be in the range between 2 and 3 percent.

The third reason, concerning the calculation of guaranteed benefits, does not seem to be valid. As shown by the Swedish PPM (see Annex B), guaranteed benefits do not need to be calculated in exactly the same way as initial benefit payments and can be based on a lower rate of interest as well as more conservative mortality tables.

**Mortality Tables.** Specifying the calculation of initial payments also requires the stipulation of the mortality tables that should be used for this purpose. In general, the tables should be based on conservative assumptions with an allowance for future increases in longevity. The same tables should be specified for all providers.<sup>21</sup> Mortality tables should be updated regularly and should be based on the pool of annuitants rather than the general population.

Historically, static period mortality tables, which did not allow for increases in longevity, were used even in advanced countries, while mortality tables were updated infrequently and were suffering from significant time lag. A common practice was to increase the age of policy holders by two years in the case of life insurance and to set it back by two years in the case of life annuities. Developing countries mainly used lagged mortality tables from the United Kingdom and the United States. Over the past two decades, however, insurance companies and pension funds have increasingly started to use dynamic cohort mortality tables that allow for projected improvements in mortality. And a growing number of middle-income countries have started to compile their own sets of mortality tables.

In countries that are members of the European Union, the use of unisex mortality tables is compulsory for pricing purposes, at least for policies linked to occupational benefits. These have potentially adverse effects on different providers and may distort marketing policies. A compensation mechanism may be necessary to transfer reserves among providers. Such a mechanism was proposed in the stalled 2008 Polish law (see section 4.4 below).

**Guaranteed Benefits.** The offer of guaranteed minimum benefits is a customary feature of participating annuities. If the other elements of VPAs are regulated, then the offer of guaranteed benefits should also be subject to regulation. The guaranteed benefits do not have to be equal to the initial benefits. As already noted, while the AIR for the calculation of initial benefits should

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<sup>21</sup> It is interesting to note that even absent such regulation, insurance companies in some high-income countries (e.g. Sweden) have adopted common mortality tables prepared by the association of insurance companies (Palmer 2008). Government regulation, especially if based on expert opinion, would not represent a major departure from current practice.



ideally be close to the long-term real rate of interest, which in most countries would imply an AIR of between 2 and 3 percent, for the guaranteed benefits a zero rate of interest would be advisable. At the same time, a more conservative mortality table should be adopted than in calculating initial benefits. In this way, the guaranteed benefits would amount to between 70 and 80 percent of initial benefits. In fact, regulators may stipulate that the guaranteed minimum benefits could not be lower than a specified percentage of initial benefits.

Guaranteed benefits should ideally rise in line with inflation, since even moderate inflation would cause a significant erosion of their real value over a ten-year period and would have rather devastating effects over a longer period. Escalating participating annuities aim to provide such a link by targeting an annual bonus that equals the rate of inflation. However, the regulation should not require an automatic link to inflation unless providers have ample access to inflation-linked instruments that would allow them to hedge their risks.

**Rules on Profit Distribution.** Market regulators need to ensure that annuity providers follow transparent and consistent policies on the distribution of profits between shareholders and annuitants. The policy of profit distribution of different providers is a crucial element of pricing policy. Together with the level of operating fees, the rate of profit sharing should be one of the most important criteria for selecting providers of variable payout annuities.

Profit sharing rules are important for participating policies because providers are responsible for determining the level of distributable profits. The regulatory authorities may decide to set the minimum profit sharing rate as a means of protecting annuitants and ensuring their fair treatment with shareholders. In Poland and Hungary, the minimum profit participation rate was set in their respective stalled laws at 90 and 95 percent of annual profits.<sup>22</sup> When guaranteed benefits are offered, annuity providers are compelled to absorb any negative profits but are allowed to recoup their losses before determining profits available for distribution in subsequent years.

**Smoothing Mechanisms.** A difficult issue for participating annuities concerns the smoothing of investment returns that is allocated to policyholders over time in an attempt to keep bonus rates stable and avoid large fluctuations in regular payments. This implies the creation of a so-called collective (or unallocated) bonus reserve. Providers should set out as clearly as possible their profit distribution and bonus reserve policies.

In practice, however, smoothing mechanisms have suffered from a lack of transparency. The declaration of bonuses has been left to the discretion of managers and actuaries who have generally sought to attain stability in the pattern of annual bonuses, while ensuring the long-term solvency of providers. Because guaranteed rates were well below market rates for several decades before the late 1980s, there was little concern about the solvency of providers and their ability to honor their promises. The overall situation changed drastically in the 1990s as interest rates started to fall. It became critical in several countries in the first few years of the new millennium when both equity prices and interest rates fell to very low levels. In response to these developments, regulators in several countries modified their regulatory framework in favor of fair value accounting, regular stress testing, and greater transparency.

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<sup>22</sup> In Germany, the profit participation regulation stipulates three minimum rates: 90 percent of investment income; 75 percent of risk surplus; and 50 percent of other operating surplus.

Many academic studies have been undertaken in recent years in various countries to ascertain the smoothing mechanism used by providers of participating annuities. A common theme of these studies has been the high level of opacity on the part of providers. Researchers have made attempts to describe prevailing practices in different countries, have stipulated various smoothing models, and have tested empirically the relevance of the models and their welfare implications. However, little concrete evidence has been documented with regard to the actual policies pursued by different providers in different countries.<sup>23</sup>

A smoothing mechanism that could work well with escalating participating annuities would entail the following elements. The policies would start with relatively low initial benefits that would be set by using an AIR close to the long-term real rate of interest (in general, 2 or 3 percent or even less if the long-term real rate of interest were lower than this level). They would also aim to declare regular bonuses that would increase at a rate that would be adequate in a low inflation country to maintain the real value of benefits. The annual result would reflect both investment performance and longevity experience and would allow for transfers to the reserves when increases in longevity exceed their expected level. When declared, the regular bonuses would be incorporated in the future guaranteed benefits. However, the regular bonuses would be suspended if the annual result was weak and the level of the collective bonus reserve was too low.

A well-specified smoothing mechanism could be used to provide greater transparency while ensuring the adequacy of reserves and the long-term financial soundness of providers. For instance, a regular bonus that compensated fully for inflation would be declared if the collective bonus reserve equaled a specified percentage, say 20 percent, of technical provisions.<sup>24</sup> However, if the collective bonus reserve fell below, say, 10 percent of technical provisions, the regular bonus would be completely suspended, while if it fell in the range between 10 and 20 percent, the regular bonus would be adjusted on a pro rata basis relative to the rate of inflation.

If the collective bonus reserve exceeded 20 percent of technical provisions, additional special bonuses could be declared. The smoothing mechanism would specify the period over which the excess might be distributed. These special bonuses would not be guaranteed and a strong case could be made for distributing them on a periodic basis, say once every three or five years. Such a smoothing mechanism would satisfy the need for greater disclosure and meaningful transparency, while preserving the ability of managers and actuaries to adjust bonus levels to financial and demographic conditions and ensure the adequacy of reserves and the long-term financial soundness of providers.

**Caps on Commissions and Operating Fees.** High administrative costs are often incurred and large commissions are paid to agents and brokers as part of aggressive marketing campaigns to increase market share. Annuity providers amortize these costs over the longer run and charge high upfront commissions and operating fees as well as high surrender charges when switching is allowed.

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<sup>23</sup> A small sample of studies that has addressed these issues includes Grossen and Jorgensen (2000), Hansen and Miltersen (2002), Miltersen and Persson (2003), Ballotta et al (2006), and Cummins et al (2007).

<sup>24</sup> The Danish ATP seems to be using this level for determining its annual bonus rate (??). However, a different level may be selected by providers in different countries, depending on the volatility of investment returns.

Annuity providers may also engage in cost transfer pricing whereby internal administrative and accounting services offered by another unit of a large group are billed at artificially high prices. Such practices benefit shareholders and lower the profits that could be allocated to policyholders.

High operating costs depress the level of distributable profits. A high level of transparency is essential, while any cost transfer pricing should be subject to detailed scrutiny. Caps on commission rates and operating fees may be necessary, especially in countries with underdeveloped insurance and annuity markets, but care must be taken to allow for the cost of capital, including a reasonable rate of return, as well as for product innovation and operational flexibility.

Caps should be subject to regular review, because there is a tendency in regulated markets for stipulated ceilings on commissions and operating fees to become the norm. The review should take into account the evolution of cost efficiency, product innovation and market sophistication. In fact, applied caps may need to be lowered over time in line with a general decrease in costs before they are eventually removed when the local markets reach an adequate level of sophistication and efficiency. The gradual decline in costs may result from a higher scale of operations, greater efficiency and a higher degree of market concentration.

Asset management fees are not always transparent in participating annuities. Providers should be required to highlight the fees charged by different funds and also any fees involved when annuitants transfer balances between different funds. Unfortunately, individual investors and annuitants are not adequately responsive to differences in operating fees among providers as well as among funds. This allows some providers to earn high asset management fees that have an adverse effect on the level of annuity benefits. Imposing caps on asset management fees may be necessary in countries where securities markets and the investment fund industry are not well developed.

### **Box 2: The Scandal of Mis-Selling Personal Pensions in the United Kingdom**

When personal pension plans were authorized in the United Kingdom in the late 1980s, no requirement was imposed on providers to ensure that transferring from an occupational to a personal pension scheme was in the best interests of the employees. This led directly to the personal pensions mis-selling scandal that erupted in December 1993.

Between 1988 and 1993, 500,000 members of occupational pension schemes had transferred their assets to personal pension schemes following high pressure sales tactics by agents of PPS providers. As many as 90 percent of those who transferred had been given inappropriate advice. Miners, teachers, nurses and police officers were among the main targets of the sales agents. Many of these people remained working for the same employer, but they switched from a good occupational pension scheme offering an index-linked pension into a PPS towards which the employer did not contribute and which took 25 percent of the transfer value in commissions and administration charges.

An example reported in the press concerned a miner who transferred to a PPS in 1989 and retired in 1994 aged 60. He received a lump sum of £2,576 and a pension of £734 by his new scheme. Had he remained in his occupational scheme, he would have received a lump sum of £5,125 and a pension of £1,791. The poor miner lost 50 percent of his lump sum and 60 percent of his pension. As a result of a public outcry, PPS providers have had to compensate those who had been given inappropriate advice to the tune of £11 billion.

Source: Blake (2001:6)

**Switching.** In traditional fixed life annuities, switching annuity provider is not permitted. Fixed life annuities are irrevocable and non-portable contracts. The irreversibility of annuity contracts is justified by the pricing of fixed life annuities, which is based on the projected life expectancy of the pool of annuitants at the time the contracts are issued and the then prevailing financial market returns. A loss of a contract because of switching would upset the actuarial and investment calculations of insurance companies and would require the levying of relatively hefty exit fees.

However, the right to switch providers is increasingly seen as a legitimate consumer right. If this is allowed, the regulators would need to stipulate clear rules on the valuation of portable balances, the share of transferors in the collective (unallocated) bonus reserve, and the levying of exit fees. Estonia has included a switching right in its 2009 law on the payout phase. To guard against adverse marketing effects and discourage excessive focus on low-risk annuitants, the regulations require annuity providers to use the same guaranteed interest rates, mortality tables and operating fees for all the annuities they provide on the same day. Annuity providers would not be allowed to discriminate among annuitants on the basis of health status.<sup>25</sup> Yet, this approach would prevent the offer of more advantageous terms to people with impaired health.

Switching may expose pensioners of advanced age to unscrupulous pressure by predatory brokers and providers inclined to take advantage of the declining mental ability of older persons. Thus, while switching may control some abuses by brokers and providers with regard to younger retirees, special safeguards would be required to protect the interests of persons of advanced age.<sup>26</sup> This is a good example of the complexity of marketing and pricing policies raised by

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<sup>25</sup> See Vittas et al (2010) for a more detailed discussion of this issue.

<sup>26</sup> I am indebted to Mark Fowler for this important observation as well as for several other insightful comments that have been incorporated in this paper.

variable payout annuities. The infamous mis-selling scandal of personal pensions in the United Kingdom in the late 1980s and early 1990s (see Box 2) adds credence to this concern.

The right to switch annuity providers is a useful consumer protection feature when providers make drastic changes in their marketing policies or are involved in mergers with other companies with very different risk profiles (see further discussion in section 6). In these circumstances, any exit fees should be suspended in order to allow undeterred switching. In addition, rules should be

### **Box 3: The Regulation of Profit Sharing in Denmark**

In Denmark, the insurance companies and pension funds that offer profit participating annuities are required to submit to the supervisor an annual notification indicating their policy of profit distribution between policyholders and shareholders, essentially by setting out the rules and assumptions for the calculation of the part of the annual result that accrues to their equity. This is often a focus of attention in the media and an important parameter affecting the competitive environment among the companies. In order to improve market transparency and comparability, the supervisor has issued a guidance on this topic. Providers do not have to comply with the guidelines but if they do the supervisor will be less likely to ask for additional explanations.

In the notification, each institution must divide the equity's part of the result into one part related to the return on equity, which is normally equal to the return offered to policyholders, and one part reflecting the extent of the risk incumbent on equity. It must also explain the rationale for the particular allocation. The notification must be in place before the beginning of the accounting year. Among other things it must specify how much extra return could be awarded to the insured if the equity was not rewarded with a risk premium. The company must classify the assumptions behind the calculation of the risk premium into: risks which are not specific to the company in question, such as financial risks, biometric risks and risks relating to cost assumptions; and risks related to the business plan of the specific company, such as its investment strategy and reinsurance program.

A company is not allowed to change the principles and assumptions governing the calculation of the risk premium during the year but has the right to change its policy when the notification to the supervisor must be renewed. No later than eight days after board approval of the annual distribution of profits between policyholders and shareholders, the providers must notify the supervisor as to the *actual* risk premium awarded to equity. Hence, the expected and actual risk premium to equity can be compared and any difference explained. The notification must also specify the amount of the equity risk premium that will not be transferred to the equity capital because the annual result is not expected to be sufficient. A larger part to owners than to policyholders may only be distributed to own funds, when this larger part plus the amounts distributed to the insurance portfolio can be covered by the result for the year. If the result for the year is not sufficient to allow distribution to own funds, the shortfall is recorded in a shadow account and is recovered from future profits.

The aim of this regulation is not to establish maximum ceilings on the risk premium to be allocated to shareholders, but to force the management to consider the risks facing equity holders and thus ensure that the remuneration of both policyholders and shareholders is fair and based on clearly specified criteria. The supervisor compiles and publishes an annual comparative table on the extra return that could be awarded to policyholders if the equity was not rewarded with a risk premium. This provides some indication of the comparative performance of different providers. However, to be fully satisfactory, the table should also include data on the level of operating costs of different providers and the returns obtained by policyholders. The complexity of products and the great variation in the terms and conditions of the multitude of collective labor agreements has impeded the compilation of such a comprehensive database, although it can also be argued that the presence of labor market associations, representing both workers and employers, may have reduced the need for it. Whatever the reason, the market suffers from the lack of completely meaningful transparency.

Source: Danish FSA, Andersen and Skjodt (2007).

adopted to ensure that exit fees are not excessive and that portable balances are not subject to improper valuations.

**Flexible Regulation.** A tight regulation along the preceding lines would introduce considerable rigidity in the management of traditional and escalating participating VPAs. Such rigid regulation is not generally recommended since it may well cause competitive distortions and impede product innovation. It is only envisaged as a temporary solution for countries with underdeveloped insurance and financial markets. A more flexible alternative is to allow annuity providers to determine their initial benefit payments and their own profit distribution policies and smoothing mechanisms but to require a high level of meaningful transparency.

This is the approach that is followed in Denmark (see Box 3), although it does not appear to address fully the need for meaningful transparency. In addition to requiring formal notification of profit-sharing policies, the Danish FSA compiles an annual table with data on the impact on policyholder returns of the equity risk premium awarded by each provider to its equity capital. This is a step in the right direction for countries where integrity risk is under effective control, although more needs to be done to ensure adequate transparency and comparability. In particular, the table should also include data on the level of operating costs of different providers and the returns obtained by policyholders.

Many other OECD countries, including Australia, Canada, the Netherlands, Sweden, the United Kingdom and the United States, also do not impose minimum profit participation rates. In the United Kingdom, the FSA imposes a general duty on providers to treat customers fairly and also requires providers to publish their Principles and Practices of Financial Management (PPFM). But the FSA does not compile any data on the extent to which providers comply with these requirements or on the relative performance of different providers. There is also no indication of the practical usefulness of PPFMs. The PPFM of the British Prudential is posted on its website, runs for no less than 48 pages, and is completely incomprehensible. This is an example of futile transparency.

#### **4.2 The Regulation of Reserving Policies of Traditional and Escalating Participating Annuities**

Maintaining adequate reserves is essential for ensuring the ability of annuity providers to meet their obligations toward pensioners. However, reserving policies are complicated by the offer of guaranteed minimum benefits and the use of complex smoothing mechanisms.

Providers of variable payout annuities are required to maintain separate reserve accounts for their VPA business (participating or unit-linked) and their fixed annuities. Traditionally, the accounts of providers were based on book values or amortized cost but increasingly accounting standards require the use of fair value accounting which implies the use of market values for actively traded assets and model valuations for illiquid and infrequently traded assets.

To determine the required level of reserves, best estimates of future benefits are first projected by assuming that the future realized investment rate of return (RIR) is equal to the AIR and are also adjusted for changes in longevity. The longevity adjustment is based on gender-specific mortality projections (even if unisex tables are used for pricing and benefit-setting purposes) and may take place on a periodic basis when it becomes apparent that observed mortality is significantly different (usually smaller) from what has already been assumed and built into the reserves. Future benefits are then discounted to the present at the AIR. This implies that if there

are no changes in longevity the required reserves will be equal to the outstanding balances of annuity assets.

Second, the future minimum guaranteed benefits are projected, again using gender-specific mortality tables instead of the unisex tables that are used for pricing purposes. These are then discounted to the present by using an appropriate market-based discount rate. Providers are required to maintain reserves to the higher of the two calculated levels.

If the guaranteed benefits are not based on high rates of interest relative to market rates, the first calculation would be the operative one. Discounting guaranteed benefits by a market-based maturity-dependent discount rate would effectively treat them as fixed liabilities, which they are, and would require an amount of assets to be invested in fixed income bonds of matching duration or to be hedged through the use of derivatives, such as interest rate swaps. The size of such matching assets would depend on the level of market rates of interest and their relationship to the rate of interest used in computing the guaranteed minimum benefits. If the guaranteed benefits are calculated with a low rate of interest, this approach would require a smaller proportion of reserves to be invested in matching assets and would allow a higher proportion of assets to be available for investment in equities and other higher-yielding assets than if the reserves for the guaranteed benefits are also calculated at the AIR.

Thus, the regulations on reserving policies for traditional participating annuities need to draw a clear distinction between the total reserves and the part of the reserves that are required to cover the guaranteed minimum benefits. Even if the AIR is stipulated by regulation to be equal to zero, allowing the reserves for the guaranteed benefits to be discounted at market rates would provide scope for a more flexible asset allocation strategy and for improved investment performance.

When providers use well established smoothing mechanisms for the declaration of bonuses, annuitants may develop reasonable expectations for such future bonuses. The regulators may then require the maintenance of reserves that cover not only the formally guaranteed minimum benefits but also the expected future bonuses. In such cases, providers would be required to maintain reserves to the higher of the outstanding balances of annuity assets and the present value of the sum of guaranteed benefits and expected future bonuses.

This approach to reserving policies is essential for the escalating participating annuities, in which regular bonuses are incorporated in the guaranteed benefits once they are declared and in which a rising level of guaranteed benefits is an integral feature of their benefit structure. The reserving policies should reflect the targeted rate of regular bonuses.

### **4.3 Pricing and Reserving Policies of PPM Participating Annuities**

The pricing and reserving policies are much simpler for the PPM participating annuities that are offered in Sweden (see section 2 above as well as Annex B). The basic characteristics of these annuities is that the longevity risk is shared among annuitants on an age cohort basis, while no smoothing mechanism is used, i.e., 100 percent of profits after the deduction of expenses is distributed each year.

On the pricing front, there is a need to specify the AIR for the annual benefit payments and the lower rate of interest that is used to calculate the guaranteed minimum benefits. The specification of appropriate mortality tables is also essential, especially because the longevity risk is shared among annuitants on an age cohort basis.

When this type of annuity is offered by a single public agency, there is less concern about deceptive pricing policies and perverse marketing initiatives (see section 6). However, the offer of such annuities in a competitive decentralized market may raise serious regulatory and supervisory challenges since it would be very difficult to verify that providers do not resort to deceptive or perverse practices. The right to switch provider without incurring undue transferring expenses would then be of crucial importance.

The reserving policies for the PPM participating annuities also involve a simpler approach since all profits are distributed each year and the Swedish Pensions Agency does not use a smoothing mechanism. The reserves are equal to the outstanding balances on individual accounts plus the present value of the cost of guaranteed benefits for the small number of accounts that might exhaust their balances and require payments to be made by the SPA. Because the reserves are invested in a stable-value portfolio, the AIR used for calculating annual benefit payments is reasonably low, the guaranteed benefits are a prudent fraction of initial annual payments, and SPA payments start after the account balances have been exhausted, the actuarial cost of the guarantees and the required additional reserves are likely to be very small.

#### **4.4 Reserving Policies and the Compulsory Use of Unisex Mortality Tables**

An important reserving issue is raised in many countries by the compulsory use of unisex mortality tables.<sup>27</sup> This rule is likely to create marketing distortions, linked to the significant difference in the life expectancy of men and women and the likely tendency of annuity providers to target male retirees. One way to mitigate this distortive effect is to require the purchase of joint life annuities by both working spouses.

An additional measure to help overcome the adverse effects of this rule and to protect providers with high-risk annuitants is to require annuity providers to calculate their technical reserves on both gender-specific and unisex mortality tables and to introduce a mechanism for making compensatory transfers among providers. Such a compensating mechanism was contemplated in the stalled Polish law of 2008 (Vittas et al 2010).

#### **4.5 Are Escalating Participating Annuities Appropriate for Developing Countries?**

This is a question that permeates the writing of this paper. Escalating participating annuities have several advantages. They provide a guaranteed floor for annual benefits and allow participation in higher returns. Although they do not protect fully against inflation risk, they aim to increase benefits in line with inflation, if not in every single year, at least over the life of the annuity. When basic bonuses are declared, they are incorporated into the guaranteed minimum benefits, which therefore keep pace with inflation. They are in this respect superior to fixed nominal

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<sup>27</sup> This reflects an EU Directive that stipulates that men and women should receive equal access to goods and services. The implementation of this rule on pensions and annuities linked to occupational benefits implies that providers are not entitled to use gender risk as a factor for pricing annuities.



annuities, which provide no protection against inflation, a defect that may harm long-lived individuals. And unlike fixed real annuities, they do not require access to an ample supply of inflation-linked securities.

Escalating participating annuities also have some advantages over other VPAs. Because they aim to declare bonuses that grow at a stable rate and are included in the guaranteed benefits once they are declared, they tend to invest predominantly in medium-term government and corporate bonds. As a result, they are exposed to moderate investment risk. Their returns are also likely to be moderate but their main attraction in addition to the low exposure to investment risk is that they avoid the annuitization risk of fixed annuities, provide better protection against inflation risk than fixed or escalating nominal annuities, and can replicate the benefits of fixed real annuities without requiring access to an ample supply of inflation-linked securities.

Their main shortcoming is the use of opaque smoothing mechanisms and concomitant lack of meaningful transparency. This gives rise to significant regulatory and supervisory challenges. Annuitants are exposed to investment risk and the nondiversifiable component of longevity risk. But of even greater importance is their exposure to the solvency and integrity risks of annuity providers.

Insurance companies that are likely to be the main providers of participating annuities in most countries engage almost everywhere in practices that undermine public trust (see section 6 and Box 4 below), especially in weak or ineffective regulatory regimes. Such practices may cover several areas, including marketing and selling techniques, pricing policies, cost transfer pricing methodologies, unfair profit sharing policies, and opaque smoothing mechanisms.

These problems caution against the use of escalating participating policies or any other VPAs for the payout phase of mandatory funded pension pillars of developing countries that lack the capacity to create robust regulatory and supervisory systems. This position is reinforced by the availability of an alternative approach that entails the positive elements of participating annuities while avoiding their most questionable features.

This alternative approach would involve the offer of fixed real annuities or, in their absence, escalating nominal annuities in combination with either phased withdrawals or unit-linked annuities without any guarantees. Under this approach, retiring workers could be allowed to invest between 70 and 100 percent of their account balance<sup>28</sup> in a fixed real or an escalating nominal annuity that would offer annual benefits that increase at a specified rate (say, 2 percent). This would provide a guaranteed income with either full or some protection against inflation. At the same time, retiring workers would be allowed to invest up to 30 percent of their balances in a phased withdrawal account or in a unit-linked annuity without any guarantees. They could invest these balances in a small number of underlying funds of their choice, reflecting their income objectives and their level of risk tolerance. The longevity risk of the fixed real annuity or the escalating nominal annuity would be assumed by the annuity provider but that of the unit-linked annuity would be shared among all annuitants, while in the case of the phased withdrawal account it would be borne by the pensioner.

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<sup>28</sup> The 70 percent threshold is indicative. Individual countries may opt for a higher or lower level, depending on the availability of a basic public pension. If the latter is significant, a higher proportion of balances could be invested in in higher return (higher risk) unit-linked annuities.

Fixed real annuities and escalating nominal annuities would be exposed to annuitization risk, i.e., the risk that at the time of retirement asset prices and/or long-term rates of interest are abnormally low. This risk can be mitigated by purchasing annuities on an instalment basis over a period of five to ten years. In contrast, escalating participating annuities would avoid this risk but they would require the creation of a robust and agile regulatory and supervisory framework, a requirement that policymakers in developing countries would find difficult to satisfy.

## **5. Pricing and Reserving Policies of Unit-Linked VPAs**

### **5.1 The Regulation of Pricing Policies of Unit-Linked Annuities**

The pricing policies of the **standard unit-linked VPAs** without any guarantees raise regulatory issues that are much less complex than those of participating annuities. This is because they distribute 100 percent of net investment income and are generally more transparent. They charge an explicit fee for administrative expenses and longevity risk. This is stipulated in the contract and is deducted from investment income. The level of asset management fees for individual investment funds may raise concerns if they are significantly higher than those applied by independent mutual funds, especially because policyholders face stiff surrender charges if they decide to transfer their business to other providers.

The regulators could specify the AIR and mortality tables that can be used for calculating initial payments and they could apply caps on operating fees, broker commissions and surrender charges. But because the authorization of unit-linked annuities presupposes the presence of reasonably well-developed financial markets, such detailed regulations are not usually applied. However, as already noted above, to avoid excessive competition and ensure that adequate reserves are maintained, a maximum cap is often, but not always, imposed on the level of the AIR. No such cap is applied in Canada and the United Kingdom.

In unit-linked annuities, greater emphasis is placed on meaningful disclosure and transparency. These cover not only the level of explicit fees, but also the asset management fees of investment funds in which balances can be invested, fees for transfers between funds, surrender charges, and fees for guaranteed minimum benefits, if they are offered.

Increasingly, unit-linked VPAs are offered with **guaranteed payout annuity floors (GPAFs)**. The guaranteed payment is based on an annuity conversion rate (or factor) that is usually calculated with a low AIR and a conservative mortality table. The stipulated conversion rate may be applied to the value of the underlying account at retirement or the ratchet value during retirement, given by the highest account value attained on a contract anniversary date. Restrictions are normally imposed on asset allocations to prevent investments in highly risky assets. Annuitants may be limited to select among stable-value funds with larger allocations in government and corporate bonds relative to equities, while periodic rebalancing among selected funds may also be required.

Providers include the guarantee fee in their stipulated total annual charges, attaining a reasonable degree of transparency. But providers retain the flexibility to raise the asset management fees on the selected investment funds, lowering net investment returns and the value of the guarantees.

The pricing of these guarantees is highly complex and reflects the cost of hedging, which in turn depends on the volatility of investment returns on the selected funds. Sudden, abrupt increases in volatility which occur at times of declining market prices and low liquidity cause a substantial increase in the cost of hedging and often force providers to suspend the offer of VPAs with guaranteed payout benefits.

**CREF and PPM unit-linked VPAs** raise even fewer regulatory issues on pricing policies, other than the paramount importance of transparency. The charges that are made for expenses and longevity changes need to be disclosed and to be supported by sound justification. In addition, any changes in the basic parameters, such as the AIR and the mortality tables, should be communicated to annuitants in a clear and comprehensible manner. The PPM unit-linked annuities as currently offered do not include guaranteed minimum benefits. This simplifies pricing and reserving decisions but transfers the investment risk to annuitants. The public or semi-public nature of the providers of these annuities implies a strong need for effective control of governance structures and a strong commitment to a high level of integrity.

## 5.2 The Regulation of Reserving Policies of Unit-Linked Annuities

Reserving policies are very easy for the **PPM unit-linked annuities**, where the liabilities are always equal to the value of the remaining assets on each account. Since the providers bear neither investment nor longevity risk, there is no need for any supplementary reserves. Future benefits will be determined by the future value of assets. This is equivalent to projecting benefits by assuming that the RIR will be equal to the AIR and discounting future benefits by the AIR. Expected mortality is reflected in the annuity divisor that is used each year to calculate annual benefit payments. The counter side to all this is that annuitants bear the investment risk as well as the nondiversifiable component of the longevity risk.

Asset valuation is based on market prices and since the assets are invested in authorized mutual funds, they reflect the daily market prices (net asset values) of those funds. There could be some problems with the valuation of particular assets held by the various mutual funds, say holdings of mortgage-backed securities that have become illiquid. These could have an adverse effect on net asset values and could depress the benefits of annuitants but they would not require the setting aside of any reserves by either the managers of the affected mutual funds nor the Swedish Pensions Agency.

Broadly similar considerations apply to the case of the **CREF annuities** as well as the **standard unit-linked VPAs** without any guarantees. A main difference is that in the standard unit-linked VPAs the mortality risk is assumed by the providers. In addition to projecting future benefits at the AIR and the assumed mortality table and then discounting back to the present by the AIR, the providers are required to create a mortality fluctuation reserve to cover future deviations between observed and assumed mortality. This is usually a relatively small reserve because providers use conservative mortality tables and future deviations are unlikely to be very large.

In contrast, reserving policies for VPAs with guaranteed payout annuity floors (GPAFs) are highly complex. The offer of GPAFs transforms unit-linked VPAs from being one of the least risky annuities from the perspective of providers to one of the most risky. This is because a very large part of investment risk is borne by the providers rather than the annuitants as in the version

without guarantees. Providers should either hedge their exposure to the increased investment risk through the use of complex derivatives and dynamic hedging programs or hold increased reserves. Specifying the required level of reserves is extremely difficult and regulators increasingly adopt a principles- rather than a rules-based approach in the setting of reserves. However, ensuring that providers are properly hedged or adequately reserved remains a big challenge. Given the high risks of these products for providers, the difficulty of ensuring the soundness of providers, and the ample scope for market manipulation, the offer of VPAs with guaranteed payout benefits should not be contemplated in countries that do not have well developed and efficient insurance and financial markets, including hedging facilities.

## **6. The Regulation of Marketing Policies of VPAs**

### **6.1 Exposure to Integrity Risk**

All types of annuities are exposed to integrity risk, i.e. the risk that providers will engage in deceptive practices with harmful effects on the interests of annuitants. Such practices are often promoted by small print conditions, improper marketing policies, and opaque pricing decisions. However, the exposure to integrity risk is much greater in the case of VPAs because pricing decisions are made throughout the life of annuitants. For this reason, exposure to integrity risk is particularly pronounced in the case of people of advanced age.

Integrity risk is similar to bankruptcy risk in that annuitants suffer losses because of inappropriate behavior by providers. In the case of insolvency, inappropriate behavior covers lack of prudence and excessive risk taking and even outright fraud. Bankruptcy risk is addressed by strengthening prudential regulation and supervision and taking early remedial action. Effective protection may also be provided through government guarantees.

But integrity risk differs from bankruptcy risk in that it does not entail the failure and closure of annuity providers. Deceptive practices may target individual groups of annuitants and may be pursued for long periods before they are detected and action is taken to correct and deter them. This is a problem that affects all types of insurance operations and is related to the widespread use of opaque contracts with a plethora of small print conditions and exclusions. Deceptive practices are often the result of competitive pressures in decentralized markets (see Box 4) but they also reflect excessive preoccupation with maximizing short-term profits and the executive compensation that is linked to them.

The regulation of marketing policies plays an important role in protecting annuitants from deceptive practices. It needs of course to be supported with effective regulation of pricing and reserving policies. However, the regulation of marketing policies is a difficult challenge in decentralized competitive markets. The selling of life annuities requires considerable marketing effort by insurance companies and 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.

#### **Box 4: Practices that Undermine Public Trust**

Insurance companies in both advanced and developing countries often engage in practices that undermine public trust. One example that is widespread in insurance markets in less developed countries is the offer of very low premiums for, say, motor insurance, by small companies that are usually weakly capitalized. Such practices are accompanied by failure to maintain adequate reserves, involvement in protracted disputes and long delays in settling claims, and eventual insolvency, leaving government regulators to sort out the mess of outstanding claims. Strengthening prudential regulation and supervision can play an important role in protecting policyholders from such unscrupulous insurers.

In advanced countries, in addition to the mis-selling saga in the United Kingdom in the early 1990s (see Box 1), the following three examples from the US market underscore this issue. First, in marketing term life insurance, American insurance companies stress that policyholders will not be required to undergo annual medical tests after the initial health screening. It is clarified that annual premiums will increase to reflect the growing mortality risk of aging individuals but subject to prescribed ceilings and will not reflect any deterioration in the health status of the insured. However, as premiums increase over time, policyholders are continuously targeted with new offers that have more attractive terms but require voluntary medical screening. Policyholders who do not respond to such marketing offers are deemed to be bad risks and are subjected to relatively large increases in premiums (within the prescribed ceilings, which are specially designed to allow for such increases). Many policyholders do not renew their policies when they realize how much more they are being asked to pay but insurers do not mind the non-renewal because these policies become loss making over time. The deception lies in the false reassurance given to prospective policyholders that they will not be subject to future annual medical tests and their annual premiums will not reflect their health status. Insurance companies are forced by marketing campaigns from their competitors to bombard their clients with new offers but they exploit their competitive advantage over other insurers in that they already have a contractual relationship with their targeted clients.

Second, in a recently revealed but long-standing practice, life insurance companies, apparently including some of the largest names, such as Metropolitan Life (which devised it in the mid-1980s) and Prudential Financial, have adopted the policy of not sending the funds to recipients of death benefits but instead placing them in so-called retained-asset accounts and forwarding a checkbook to recipients, which they can use to draw the funds over time. The letter to recipients presents this as a convenient and safe means to hold their balances, allowing them time to decide how to use the funds. However, the communication does not indicate that the funds are not placed in a proper bank account. A disclosure is usually made in small print that the accounts are not covered by the federal deposit insurance guarantee. The rate of interest paid on these retained-asset accounts is in most cases below competitive levels available on comparable bank accounts (although reportedly the TIAA-CREF paid in 2009 the relatively very high rate of 4 percent (Leondis, 2010)). The funds are held in the general corporate account of the insurers rather than in segregated accounts and are invested in government and corporate bonds, earning returns that increase the profits of insurers. The practice has attracted considerable criticism because it has affected the families of deceased soldiers (Evans 2010) but it has been applied to policies covering both members of the military and employees of the federal government. Neither state insurance regulators nor representatives of the federal government had until recently objected to this practice.

The third example concerns the practice of contract rescissions (cancellations) that has been widely applied by health insurance companies in their individual policies to people who suffer from serious illnesses. This practice was highlighted during the protracted and contentious public debate on health care reform in the US. It allegedly involved health insurers employing large contingents of staff with the remit to engage in so-called 'post-claims underwriting' in order to identify reasons for which the contracts could be cancelled for alleged violations committed during the application process. Because the practice denied or delayed coverage to people with serious health problems it generated considerable criticism and led to its prohibition under the new health care legislation that was enacted in 2010. However, the new act will be implemented over the next few years and it remains to be seen how effective the implementing regulations will be in preventing such abuses by health insurance companies. The new law allows contract cancellations only if insurance fraud is committed. In general, state insurance regulation has not required the compilation of statistical data on the use of contract rescissions by health insurers.

Unfortunately, as in the case of retained-asset accounts and the marketing of term life insurance, state insurance regulators have been acquiescent to the use of these practices by insurers and have failed to protect the interests of consumers. It is unfortunate that because insurance regulation is not a federal responsibility, the new Consumer Financial Protection Board that has been set up to prevent abusive practices in banking, credit card, and mortgage finance business will not also cover the insurance sector.

The regulatory issues cover the stipulation of basic conduct rules, the creation of a centralized database, the regulation of broker commissions, the prevention of deceptive pricing practices, and the prohibition of perverse marketing campaigns.

## **6.2 Basic Conduct Rules**

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 life annuity products are highly complex, 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.

## **6.3 Creation of Centralized Databases**

Adopting a centralized electronic quotation system, such as the one introduced in Chile in 2004 (Rocha and Thorburn, 2007; Reyes and Stewart, 2008), 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-priced annuities.

An electronic quotation system is essential in the case of fixed nominal or real annuities as well as escalating annuities, but it can also be useful for all kinds of variable payout annuities. It can facilitate the comparability of different offers and underscore the various types of guaranteed benefits and the charges that are levied for each type of benefit.

However, to strengthen competition in the market for variable payout annuities, the central register should also compile comparative data on a consistent and informative basis on the performance and bonus policies of different providers. This will enhance the transparency of the system. The register should focus on key aspects of pricing policies and performance, such as profit-sharing rules, levels of operating costs and fees, commission fees and surrender charges, and consistency and soundness of investment policies rather than on a mere reporting of past performance data. At the same time, annuitants should be encouraged to select providers with diversified investment portfolios, a consistent record of sound performance, low operating fees, and high profit participation rates. 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.

A central register along these lines is easier to operate for participating policies where the number of factors that need to be followed is relatively small. It is a much greater challenge in the case of US-style variable annuities with their wide range of guarantees. In recent years various websites have been created that compile such data. What is needed is effective regulatory

oversight to ensure that the various websites are objective and impartial in the data they collect and publicize.

It is interesting to note that neither Denmark nor Sweden, two countries where participating annuities are widely used, has a central register compiling performance data on a systematic basis. In both countries, the offer of such annuities is based on broad collective labor agreements where representatives of workers and employers may be expected to 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.

#### **6.4 Regulation of Broker Commissions**

The structure and level of commissions payable to brokers and agents also 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 also 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. In the US, broker commissions on sales of variable annuities exceed 5 percent and may even reach 8 percent of the premium. This probably explains the large volume of policy exchanges when the surrender charge period is concluded (see Annex C).

#### **6.5 Prevention of Deceptive Pricing Practices**

Another potential problem concerns the use of deceptive pricing practices. This is a more serious risk in the case of participating policies where the use of opaque smoothing mechanisms may conceal the true level of investment profitability. If providers are free to set initial payments on participating policies and apply entry (front-load) and exit fees, there will be a strong temptation to offer annuitants high initial payments in order to attract their business but declare 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 to new retirees 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 discourage annuitants to switch to other providers when switching is allowed. Such practices are not uncommon in retail financial markets as was highlighted by the extensive use of very low teaser rates, high loan-to-value ratios, and prohibitively high prepayment fees in the recent sub-prime mortgage crisis.

A related issue in the marketing of VPAs concerns the potentially misleading use of bonus projections and illustrations. These are often used aggressively at the point of sale. Although providers are required to indicate that past performance does not guarantee future results, brokers and selling agents may resort to unreasonable illustrations of future investment performance and bonuses in the promotion of their products.

Creating a comprehensive central register on performance along the lines suggested above and compulsory use of standardized disclosure templates will contain the tendency to abuse illustrations of future performance and projected bonuses and will play a big part in containing deceptive practices. Regulating pricing policies and the setting of initial payments is another option that may be more relevant for countries with less developed insurance markets (see section 4 above).

## **6.6 Prohibition of Perverse Marketing Practices**

When longevity risk is shared among annuitants, competition in the market for variable payout annuities may 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 providers with different risk profiles. When marketing policies undergo drastic change, annuitants should be allowed to switch to another provider within a specified period of time and without incurring any exit fees.

Such measures may not prove adequate if annuitants do not respond in a timely fashion to the period of no exit fees. In fact, given their old age and the general lack of consumer responsiveness to price signals in retail financial markets, it is unlikely that they will do so in sufficiently large numbers. A more drastic and effective protection of the rights of low-risk annuitants would need to be provided by regulators and supervisors.

Providers of VPAs depend on their investment performance and their management of longevity risk to attract new business. It is important that marketing regulations deter providers and their brokers from emphasizing recent investment returns that are not good predictors of future performance, but rather focus on factors that affect long-term performance, such as the soundness of their investment policies, the level of their operating costs and fees, and their profit-sharing policies.

## **7. Market Structure, Prudential Regulation and Government Guarantees**

### **7.1 The Regulation of Market Structure**

A key policy question concerns the institutional organization of the market for annuity products. The choice is between decentralized competitive structures, which prevail in most OECD countries, and the creation of centralized agencies that are responsible for all or some of the services offered by annuity providers. A centralized agency for some segment of the market may, of course, operate alongside decentralized structures in other segments.

Decentralized competitive market structures promote greater competition, innovation and efficiency. A major advantage is the ability to experiment on a small scale as individual institutions introduce new products or practices in an attempt to gain competitive edge. In



addition, competition among innovating providers stimulates the search for improvisations. Innovation, experimentation and improvisation are more difficult, though not impossible, with centralized agencies. In fact, the record of innovation of centralized agencies in Denmark and Sweden has been remarkable.

However, because of scale economies and high marketing costs, decentralized markets suffer from growing market consolidation, veering over time toward oligopolistic structures and the prevalence of a small number of providers. This tends to negate their innovation and efficiency advantages. The case for a decentralized competitive structure is significantly weakened if strict restrictions apply to the offer of annuity products and their pricing. It is also weakened if providers 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 behavior and 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.

Centralized provision enjoys a number of potential advantages. It allows for a larger base of risk pooling, especially if annuitization is compulsory, benefits from scale economies and avoids the heavy marketing costs that are incurred by decentralized providers. On the other hand, its main disadvantages 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.

Centralized provision is quite common in annuity markets. 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 compulsory inflation-indexed lifetime annuities, their products play a central part in the annuity markets of most countries. However, some countries, and especially Denmark and Sweden, have gone one step further and have created 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.

The centralized agencies of Denmark and Sweden operate with a very high level of efficiency and have exhibited an impressive record of innovation. 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). 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 traditional ‘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.

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 been copied by the private sector (Palmer 2008). But public sector institutions in most low and middle-income countries tend to suffer from operating inefficiency and a poor record of innovation. The key requirement is to adopt robust governance safeguards with high levels of transparency and public accountability.

The regulation of marketing and pricing policies is in general much simpler in a centralized market structure. There is no need for elaborate controls on marketing campaigns and the creation of electronic quotation systems. 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.

The centralized institution needs to respond to enquiries from retiring workers by providing appropriate quotations taking into account the age cohort of applicants and their product choice. 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 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. Another main challenge ensuring transparency, top notch governance and independence to prevent such a system being subject to political interference in its operations and its financial soundness.

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 may give rise to significant transfers from older to younger cohorts. All these policy variables and objectives need to be clearly spelled out in a transparent and effective way.

In the case of unit-linked annuities with decentralized asset management, the three main concerns, in addition to setting the AIR and appropriate mortality tables, are the selection of authorized asset managers, the organization of periodic switching among asset managers, and the handling of minimum guarantees, if any are offered. The management of longevity risk needs to be clarified in both types of variable annuities, including the treatment of retiring workers with impaired health.

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. The centralized providers in Denmark and Sweden have not so far created separate longevity pools based on health status.<sup>29</sup>

Countries that adopt a centralized structure for second pillar pensions could follow the Swedish example and 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 payout 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 asset managers with the lowest operating fees are allowed to participate. The centralized institution would collect all individual asset mandates and transfer funds to the selected asset managers without revealing the names of their clients.

Taking into account the competitive inefficiencies of decentralized markets, especially in supplying variable payout 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 unit-linked variable payout annuities, while fixed real and nominal annuities could be offered through a decentralized competitive market.

## **7.2 Prudential Regulation**

The main objective of prudential regulation is to strengthen the solvency of annuity providers. The maintenance of technical reserves is the first step in this process. Solvency strengthening also involves the maintenance of an adequate level of capital. Historically, capital requirements for life insurance companies have been related to the level of technical reserves and have not been risk-based. In most cases, the required capital equals 4 percent of technical provisions plus 0.3 percent of sums assured. This is reduced to 1 percent when the providers do not assume the investment risk. A similar approach is followed for annuities, except that in their context, the relevant risk exposure is respectively the technical provisions and the amount of annual payments.

Increasingly, however, the riskiness of both assets and liabilities is taken into account in setting capital levels. Several countries, including Canada and the United States, have long applied risk-based capital requirements and this approach is now spreading to other countries around the world.

In the European Union, the introduction of the so-called Solvency II regime has been under intensive discussion for a number of years. This will replace the solvency I regime that has been applied since the mid-1970s. The new solvency system will also define the types of capital as well as the types of assets that are admissible for prudential purposes.

The role of hedging facilities in alleviating reserve and capital requirements is also actively debated in a similar fashion to the use of reinsurance facilities. Considerable emphasis is

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<sup>29</sup> See Sigma (2008) and Rocha and Vittas (2010) for a brief discussion of these issues.

increasingly placed on solvency testing whereby annuity providers are required to conduct stress tests on a regular basis to assess the impact on solvency of prescribed shocks in financial markets. The nature and structure of stress tests is still evolving.

The various stress tests that have been applied in different countries are still at an early stage of development. In general, they have been specified in static terms, have not reflected past experience, and have been invariant to the state of financial markets. Ideally, the stress tests should take into account the historical variance and covariance of asset returns over a sufficiently long period of time and should allow for the state of financial markets.

A difficult policy dilemma faced by the stress tests, and risk-based supervision in general, is that they require annuity providers to assess their resilience to declining market values without making any allowance for the long-term nature of their liabilities. Even at times when market values are at historically low levels, annuity providers may be required to test their capital base against further substantial declines in market values. While there is no easy answer to this dilemma, excessive reliance on such stress tests runs the risk of forcing institutions to adopt overly conservative investment policies to the detriment of investment returns.<sup>30</sup>

The required solvency margin could be related to the size of the deviation of current prices from long-term trends. If individual institutions maintain reasonably matched and/or hedged 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.

Solvency requirements and dynamic solvency testing should, in principle, be the same for both fixed and variable payout annuities. Guaranteed benefits of VPAs should be treated like fixed liabilities. An important complication may arise from the potentially greater use of hedging facilities in the case of guaranteed options given to holders of variable annuities. Counterparty risk would then need to be closely monitored, especially if customized, non-exchange-traded products are utilized. In addition, the likely behavior of annuitants in exercising the options offered to them would present a difficult managerial and regulatory challenge because past experience has shown that this is very hard to model and predict with a satisfactory degree of accuracy.

### **7.3 Government Guarantees**

Government guarantees merit serious consideration in any pension system. Bankruptcy risk is present in all types of financial products, but is particularly important in the case of life annuities. In recent years, it has become increasingly possible for 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 a robust and effective system of prudential regulation and supervision and to protect annuitants in cases of provider failure.

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<sup>30</sup> In Denmark the regulators allowed the use of a more lenient yield curve between October 2008 and October 2010 rather than causing institutions to engage in forced sales in a declining market. Similar forbearance during the extreme circumstances of the 2008 global financial crisis has been exhibited by bank and insurance regulators in most other advanced countries.

The government guarantees could emulate the practice evolving in deposit insurance schemes, including upper limits on the amounts insured and application of risk-based premiums on annuity providers. A reasonable amount of coinsurance by pensioners should also be included in order to minimize the possible loss of market discipline at the point of purchase.<sup>31</sup> The guarantees could cover 100 percent of benefits up to a specified basic threshold and then a very high percentage, perhaps 75 or even 90 percent, of amounts above the threshold up to a reasonable upper limit. In the case of variable payout annuities, the guarantees should cover the guaranteed benefits and losses arising from insolvency resulting from fraud and gross negligence but they should not cover investment losses that arise in the normal course of business from fluctuations in asset prices.

The expected fiscal cost of government guarantees should be subject to detailed estimation and their financing should be carefully considered. Government guarantees may be financed by ex ante or ex post assessments on all providers or from budgetary resources. Risk-based premiums may be applied, although these are often difficult to design. As in the case of deposit insurance, adopting a speedy resolution mechanism that provides for early interventions in companies facing financial difficulties and nearing insolvency is essential for containing the costs of the guarantees and minimizing distortions in incentives.

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<sup>31</sup> In bank deposits, the use of co- insurance has been declining in recent years, because of the realization that bank runs were more likely to happen when depositors were exposed to significant losses. However, in life insurance and annuity business, runs on providers are less likely to occur and, if they happen, they do not have the same adverse impact as bank runs.

## Annex A

### The Payment Formula of the Standard Unit-Linked Variable Payout Annuity<sup>32</sup>

The initial benefit payment is calculated in a similar fashion to a fixed annuity and is based on an assumed investment rate of return (AIR). If the benefit is paid at the beginning of the year, the net capital premium,  $K$ , is equal to the present value of the following series of payments over the life of the annuitant:

$$K = A_1 + A_2 + A_3 + A_4 + A_5 + \dots + A_n$$

or

$$K = B + B \cdot P_1 \cdot v + B \cdot P_2 \cdot v^2 + B \cdot P_3 \cdot v^3 + B \cdot P_4 \cdot v^4 + \dots + B \cdot P_{(n-1)} \cdot v^{(n-1)}$$

$K$  is the sum of the present values of all benefit payments;

$A_t$  is the present value of benefit payment in year  $t$  and is also the reserve set aside for making this payment;

$B$  is the benefit payment;

$P_t$  is the probability of survival at the end of the  $t$  year or the beginning of the  $(t+1)$  year;

$v$  is the discount factor, which is equal to  $1/(1+\text{AIR})$ ;

AIR is the assumed investment rate of return; and

$\text{RIR}_t$  is the realized investment rate of return in year  $t$ .

At the beginning of the second year the reserve for the second benefit payment to all surviving annuitants in the standard unit-linked VPA is:

$$A_2 = B \cdot P_1 \cdot (1 + \text{RIR}_1) / (1 + \text{AIR})$$

Dividing by  $P_1$  gives the benefit per surviving annuitant:

$$B_2 = B \cdot (1 + \text{RIR}_1) / (1 + \text{AIR})$$

The reserve for the third benefit payment to all surviving annuitants is:

$$A_3 = B \cdot P_2 \cdot (1 + \text{RIR}_1)(1 + \text{RIR}_2) / (1 + \text{AIR})(1 + \text{AIR})$$

Dividing by  $P_2$  gives the benefit per surviving annuitant at the beginning of the third year:

$$B_3 = B \cdot (1 + \text{RIR}_1)(1 + \text{RIR}_2) / (1 + \text{AIR})(1 + \text{AIR}) = B_2 \cdot (1 + \text{RIR}_2) / (1 + \text{AIR})$$

The reserve for the fourth benefit payment to all surviving annuitants is:

$$A_4 = B \cdot P_3 \cdot (1 + \text{RIR}_1)(1 + \text{RIR}_2)(1 + \text{RIR}_3) / (1 + \text{AIR})(1 + \text{AIR})(1 + \text{AIR})$$

Dividing by  $P_3$  gives the benefit per surviving annuitant at the beginning of the fourth year:

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<sup>32</sup> This annex draws on Macarchuk (1969), Feuer(1969) and Fowler (2010).

$$B_4 = B \cdot (1 + RIR_1)(1 + RIR_2)(1 + RIR_3) / (1 + AIR)(1 + AIR)(1 + AIR) = B_3 \cdot (1 + RIR_3) / (1 + AIR)$$

Continuing with subsequent payments yields the formula:

$$B_t = B_{(t-1)} \cdot (1 + RIR_{(t-1)}) / (1 + AIR)$$

The rationale behind this formula is that the realized investment rate of return (RIR) must be equal to the AIR for the benefit to remain constant. If the RIR is higher, the benefit increases; if it is lower, the benefit decreases. However, if the RIR is higher for a number of years, a big fall below the AIR is needed for the benefit to decrease below its initial level. Nevertheless, investment returns on equity markets and other real assets are prone to very large fluctuations that may indeed cause later benefits to fall below the initial level. This is clearly more likely to happen when using a high AIR and this is the reason why regulators in most jurisdictions impose an upper limit on the level of the AIR.

## Annex B

### The PPM Annuities<sup>33</sup>

This Annex reviews the main features of the two types of PPM annuities offered by the Swedish Pensions Agency (SPA). To set these products in context, this is preceded by a brief exposition of the role of the PPM/SPA in the Swedish pension system.

#### B.1 The Basic Set Up

The PPM (*Premiepensionsmyndigheten* – or Premium Pension Authority) was created in 1994 as a separate government agency to manage the funded component of the new Swedish public pension system. In 2010, it was merged into the Swedish Pensions Agency (SPA), a new entity that was established to administer all public pensions. It now operates as a department of the SPA.

The SPA maintains the individual premium pension accounts of the new public component, collects and credits contributions to individual accounts from the Swedish tax office, transfers funds across different asset managers, collects and makes available (daily) information on participating mutual funds, offers a wide range of information services to participants, and is the monopoly provider of the PPM annuities.

The new financial defined contribution (FDC) scheme is a compulsory plan that is funded with a contribution of 2.5 percent of covered earnings. The contribution to the nonfinancial or notional defined contribution (NDC) scheme, which replaced the old defined benefit scheme but continues to be operated as an unfunded pay-as-you-go scheme, was set at 16 percent. These mandatory contributions are subject to a relatively low ceiling that is in fact just above the level of average earnings.<sup>34</sup>

Workers born before 1938 are entirely covered by the old scheme, while those born after 1953 are covered by the new scheme. For the transition generation, earnings of persons born in 1938 are covered 16/20 by the old scheme and 4/20 by the new; the respective fractions change by 1/20th each year so that people born in 1953 are covered 1/20 by the old scheme and 19/20 by the new. It follows that people born in 1938 were required to make a contribution of just 0.5 percent of earnings to the FDC, while those born in 1944 were still contributing only 1.25 percent. It was people who were less than 40 at the time the new system became active that were required to make contributions at the full rate of 2.5 percent. However, even the full rate is a small contribution rate and underscores the supplementary nature of the FDC.

Contributions to the FDC are collected together with all other social insurance contributions, including NDC contributions - and taxes in general - by the National Tax Authority. These contributions are initially placed in a global account with the National Debt Office earning interest at

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<sup>33</sup> This Annex draws extensively on Palmer (2008) and the updated summary of that paper that is included in Rocha et al (2011). The discussion of the Payout Stage is based on detailed data and information kindly provided by Lars Billberg, Chief Actuary of the SPA. The review is based on data provided in the spring and summer of 2010.

<sup>34</sup> Nearly all Swedish workers also participate in occupational pension plans that are governed by collective labor agreements. For the majority of workers the contribution rate to these plans amounts to 4.5 percent, for a total mandatory pension saving of 23 percent of earnings. However, high-income workers make contributions to occupational plans at much higher rates, that may reach up to 18 percent, to compensate for the low overall ceiling of the public pillars. The main occupational plans are now organized in the same way as the PPM pillar (Palmer 2008).



the average yield of Swedish government bonds. Allowing for the process of income-tax reconciliation, new contributions are credited to individual accounts annually, on average about 18 months after they have been withheld.

## **B.2 The Accumulation Stage**

During the accumulation stage, the FDC scheme is based on centralized administration, avoiding excessive marketing costs and benefiting from scale economies, but combined with decentralized asset management. When contributions are credited to individual accounts, participants have the right to select their asset managers and investment funds. The SPA acts as a clearinghouse between workers and the participating private funds. Allocations of new contributions and requests for fund switches are all grouped together and executed jointly on each transaction day by the staff of the SPA. The transactions are registered on individual accounts kept by the SPA. A fund manager's client is the SPA, not the individual participant.

All fund managers, licensed to operate in Sweden, are allowed to participate in the PPM system. Fund managers are required to follow the rules and regulations set out by the Swedish Financial Supervisory Agency (SFS), which supervises the funds. Fund providers must sign an agreement with the SPA, which includes agreeing to provide information upon request, not to charge withdrawal fees, to compute and report electronically and on a daily basis fund share values to the SPA, and to provide a periodic report of administration charges.

A company registered to do business in the PPM system can offer one or more funds. In December 2009, 88 domestic and foreign companies offered 777 funds in the PPM system. There is a publicly managed default fund for non-choosers, known as the AP7 fund, which throughout the short life of the system has held the assets of around a third of the system's participants, but a smaller percentage of total assets because workers who make an active choice have on average higher account balances.

In 2007, workers were allowed to switch back into a premium choice fund operated by the AP7 fund after having made an active choice for another fund. In 2010, the default fund was redesigned as a leveraged lifecycle fund,<sup>35</sup> while the AP7 premium choice fund was closed down and was replaced by two new funds, one invested in equities and the other in fixed income securities. Reflecting economies of scale, these funds will charge management fees of 15 and 9 basis points respectively, the lowest in the PPM system.

Fund switching is allowed on a daily basis, although switching transactions take around three business days. In 2009 about 15 percent of participants performed one or more switches, with an average of five switches per year per switching person. The number of switches has risen steadily from 1.2 million in 2005 to 2.6 million in 2007 and 4.5 million in 2009. Nearly all switches (99.8 percent) were performed in 2009 using the SPA's website. Advisory services have been developed, offering tools for account follow-up and for fund switching. One such application is available free of charge on the system's website but other advisory services are offered by external parties for a fee.

The agreement that fund managers conclude with the SPA also involves accepting a system of maximum fee charges. A fund can levy its normal administrative fee minus a discount that depends

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<sup>35</sup> Individual accounts in the default fund will be invested 150 percent in equities through the use of derivatives until their owners reach 55 and will then be gradually switched into fixed income investments. These changes reflect the continuous modifications of the new system as its managers seek to adopt the most appealing solutions. This pattern is also reflected in the products for the payout stage.

on the balance of PPM assets held. Since there are economies of scale in large holdings of PPM assets, the size of the allowable administration fee decreases with the scale of PPM assets managed by all funds in a registered company. Prior to April 2007, the allowable fees were based on individual funds' holdings of PPM balances. In 2009, total costs for the scheme amounted to 26 basis points, according to the PPM annual report.

Participants in the PPM-administered FDC scheme increased from 4.4 million in 2000, the first year of operation, to 6.2 million in 2009. In 2009, there were 664,000 pensioners in the PPM pillar, about a quarter of all pensioners. The annual flow of new funds into the system has been just about one percent of GDP. At year's end 2009, total assets posted on individual accounts equaled 340 billion SEK – equivalent to about 11 percent of GDP. The average nominal rate of return from 1995 through 2009 was 3.2 percent (with an average rate of inflation of around 2 percent). In 2009, in addition to the funds that were posted on individual accounts, the SPA/PPM also held 27.6 billion SEK that represented the contributions made during 2009 and invested with the National Debt Office.

Despite the very large number of participating funds, it is a characteristic of the PPM system that fund choices are highly concentrated. In 2009, the ten largest funds, including the default fund, accounted for 44 percent of total PPM assets, while the share of the top twenty funds equaled 54 percent of total assets. The Premium Savings Fund, which was the default fund managed by the Seventh AP fund, accounted for 26 percent of total assets.

Another characteristic has been the strong preference of participants for equity investments. At the end of 2009, almost 90 percent of PPM assets were invested in equities, an asset allocation pattern that has been prevalent since the creation of the PPM pillar. This may at first glance appear excessive. However, as noted by Palmer (2008), it can be explained by two factors. First, for younger cohorts, i.e. those born after 1954, a high proportion of equity investments is generally considered appropriate. Second, for older cohorts, the accumulated account balances in the new system have been very small, both because the contribution rate has been very low and because the period of contribution has been short. Thus, the relevance of the PPM system for the overall pensions of older participants has been minimal. Hence, it is not surprising that older cohorts have tended to “take a gamble” by investing heavily in equities.

### **B.3 The Payout Stage**

The SPA is the sole provider of PPM annuity products for the public FDC scheme. These are specified in law. Participants can choose between single and joint *life* annuities, which can take the form of variable annuities, either traditional participating (with-profits) annuities or unit-linked annuities. Lump-sum payments or withdrawals over shorter periods than a life are not permitted. To date, around 90 percent of PPM pensioners have chosen an individual and about 10 percent a joint-life annuity. Most pensioners (85 percent) have selected unit-linked annuities.

If they choose a traditional variable annuity, participants turn over their fund balances at retirement to the SPA/PPM, which currently enlists the investment services of a publicly managed fund for its bond portfolio and, beginning in 2007, four private funds for managing its equity portfolio. A unit-linked annuity leaves the account balance in the individual's chosen private funds. In both cases, annuity payments are recalculated at the beginning of each calendar year by taking into account the investment performance and longevity experience of annuitants. Unisex mortality tables are used. Participants are allowed to transfer their pension rights to spouses but this applies only to contributions made and investment income earned after the right to transfer has been exercised. To

date only a few thousand participants have taken advantage of this option. Annual pension amounts are still very small, due to the very short coverage time and the gradual transition rules.

The PPM pillar offers two types of annuities: unit-linked and participating annuities. It operates with very low operating fees that amounted to 24 basis points in 2009. It also has a policy of distributing 100 percent of profits in both types of annuities. It does not utilize a smoothing mechanism and is thus highly transparent. Considerable effort is spent in communicating the mechanics and results of the system to members through the annual publication of the Orange Report that covers the whole of the public pension system and through so-called individualized Orange Letters that are mailed to both active workers and retirees with annual details on the performance of their account and their prospective (or actual) benefits. The SPA/PPM also maintains an efficient website with a large quantity of data on various aspects of the PPM system.

#### **B.4 The PPM Unit-Linked Annuities**

The mechanics of the PPM unit-linked annuities involve the calculation of initial payments and then annual adjustments in light of investment performance and longevity experience. The initial payments are calculated at retirement by taking into account the accumulated capital during the active life of the retiring worker, an assumed investment rate of return (AIR) and the projected unisex mortality table corresponding to the age of the retiring worker. The SPA uses the mortality tables prepared by Statistics Sweden, although it is responsible for selecting between alternative projection scenarios and for making adjustments to the mortality assumptions in particular cases.

Table B.1 shows the initial calculation and subsequent changes for a worker who retired at 65 in 2002.<sup>36</sup> This worker had accumulated a sum of 5,000 Swedish crowns, which was less than 1,000 US dollars, a reflection of the fact that he or she contributed for a short period of time and at a very low rate. The account balance was divided by the annuity factor of 13.87, which was calculated using the actual age of the retiree, an AIR of 4 percent, a projected expense rate of 0.30 percent, and expected mortality.

The annuity income during 2002 amounted to 360 SEK, which corresponded to 30 SEK per month or about 6 US dollars! This was clearly a paltry amount for any country, let alone Sweden. Its calculation and payment was the result of the decision not to allow any lump sums, even if accumulated balances were puny. However, one benefit of having to calculate and pay annuity benefits during the early years of the new system is the experience that has been gained on how best to organize the offer of annuity products.

During 2002, the account suffered an investment loss of 31.3 percent, reflecting the investment choices made by the account holder. This resulted in a loss of 1,509 SEK, which was obtained by calculating the negative rate of return with the amount given by the original balance less half the yearly annuity income. The latter was in most cases paid at the beginning of each month. The account balance was then debited with the operating fees and credited with the survival credits (inheritance gains in Swedish terminology), computed in the same way as the investment income.

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<sup>36</sup> This is a hypothetical illustration that is intended to utilize all investment performance and operating cost data since PPM annuities started to be offered in 2002. In fact, a 65-year old worker retiring on the first day of 2002 would have been born on the last day of 1936 and would not therefore have been covered by the PPM pillar. However, a co-insured spouse could have been covered. Alternatively, a person born on the first day of 1938 could have started receiving a PPM pension on the second day of 2002 at age 64.

The operating fee amounted to 0.30 percent, while the mortality rate was equal to 1.18 percent. The account balance amounted at the end of the year to 3,173 SEK.

Table B.2 shows the AIR, the assumed cost rate, the realized rate of investment return, the annual operating fee and the mortality rate that were used in subsequent years for the calculation of benefit payments. It can be seen that the AIR was lowered to 3 percent between 2003 and 2006 (effective rate 2.7 percent) and was then raised back to 4 percent (effective rate 3.9 percent). The assumed expense rate was lowered to 0.10 percent in 2007. The charged operating fee fell to 0.16 percent in 2006 but then rose again and reached 0.24 percent in 2010. The mortality rate experienced a steady increase and reached 1.94 percent in 2009 but then fell back to 1.63 percent in 2010.

**Table B.1: Evolution of Annuity Income in the PPM Unit-Linked Annuities**

Year	Age	Balance	Annuity Factor	Annuity Income	Investment Income	Operating Fees	Survival Credits
2002	65	5,000	13.87	360	-1,509	14	57
2003	66	3,173	14.83	214	534	9	37
2004	67	3,521	14.35	245	292	9	53
2005	68	3,611	14.57	248	1,057	8	52
2006	69	4,465	14.13	316	517	7	71
2007	70	4,730	11.65	406	253	7	74
2008	71	4,644	11.25	413	-1,531	9	75
2009	72	2,767	10.85	255	918	7	51
2010	73	3,475	10.76	323		8	54

Source: SPA

Tables B.1 and B.2 show a very large fluctuation in investment income. This is a result of the very high concentration in equity investments and reflects the unusually turbulent performance of equity markets over the past decade. It should be noted that the unit-linked annuities are offered without any guarantees. Pensioners are exposed to very high investment risk but the sums involved are so small that very little can be inferred about the welfare implications of this product. Of course, active workers have also experienced similar wild fluctuations. Seeking more stable asset allocations could well be more meaningful for workers in their fifties who are approaching retirement and may have more substantial sums of money at risk.

**Table B.2: Determinants of the PPM Unit-Linked Annuities**

Year	Age	AIR	Assumed Cost	Investment Return	Annual Fee	Mortality Rate	Implied Period
2002	65	4%	0.30%	-31.3%	0.30%	1.18%	19.82
2003	66	3%	0.30%	17.4%	0.30%	1.22%	19.20
2004	67	3%	0.30%	8.6%	0.27%	1.55%	18.38
2005	68	3%	0.30%	30.3%	0.22%	1.50%	18.75
2006	69	3%	0.30%	12.0%	0.16%	1.64%	18.01
2007	70	4%	0.10%	5.6%	0.16%	1.64%	15.17
2008	71	4%	0.10%	-34.5%	0.20%	1.69%	14.47
2009	72	4%	0.10%	34.8%	0.25%	1.94%	13.79
2010	73	4%	0.10%		0.24%	1.63%	13.64

Source: SPA

The last column of Table B.2 shows what is described as the implied (fixed) period. This is the period for which the annuity would have been paid if it had been arranged for a fixed period, given

the AIR and annuity factor used. This is not the same as life expectancy but provides an approximate estimate of the latter. The sudden fall in the implied period in 2007 was caused by the adoption by the SPA of the medium mortality scenario of Statistics Sweden (until then the low mortality scenario had been used). This shows the willingness of policymakers to use a less conservative mortality table. Such an approach is amply justified by the fact that the longevity risk is assumed by the retirees.

**Table B.3: Projected and Observed Makeham Parameters**

Year	Age	Projected			Observed		
		A	b	C	A	B	C
2002	65	0.00050	0.00000355	0.1170	0.00020	0.00000744	0.1122
2003	66	0.00050	0.00000355	0.1170	0.00020	0.00001294	0.1027
2004	67	0.00050	0.00000355	0.1170	0.00020	0.00001060	0.1078
2005	68	0.00250	0.00000750	0.1050	0.00009	0.00001180	0.1043
2006	69	0.00250	0.00000750	0.1050	0.00009	0.00001750	0.0984
2007	70	0.00820	0.00000010	0.1576	0.00010	0.00001390	0.1002
2008	71	0.00820	0.00000010	0.1576	0.00030	0.00000450	0.1149
2009	72	0.00820	0.00000010	0.1576	0.00030	0.00001020	0.1039
2010	73	0.00640	0.00000018	0.1498	0.00030	0.00001280	0.0970

Source: SPA

The expected mortality that is reflected in the annuity factor is based on the Makeham parameters used by Statistics Sweden for its population projections. These are shown in Table B.3 together with the parameters that are used for calculating observed mortality, which is in turn used for computing the annual survival credits.<sup>37</sup>

## B.5 The PPM Participating (With-Profits) Annuities

Tables B.4 and B.5 show the same calculations for the participating annuities. The benefit of using a more stable asset allocation is clearly shown in the investment results and the greater stability of annual benefits.

The tables show that between 2002 and 2006, the same AIR was used for both types of annuities, but since 2007 while the AIR for the unit-linked annuity was raised back to 4 percent, that for the participating annuity was lowered further to 2.3 percent. The calculation of expected mortality and the derivation of observed mortality, which is used for calculating the annual survival credits, have been based on the same Makeham parameters for the two annuities (Table B.3).

Participating annuities are offered with a minimum guaranteed benefit. For workers who retired in 2002, this was calculated with a 3 percent rate of interest (2.7 percent effective) but a lower expected mortality. The SPA/PPM assumed a further 10 percent improvement in mortality over and above the low mortality scenario used by Statistics Sweden. In 2002, the guaranteed benefit amounted to 317 SEK per year, which equaled 88 percent of the initial benefit.

<sup>37</sup> The Makeham parameters for projected mortality were based: in 2002, on the low mortality scenario (LMS) for an individual born in 1941 from the 1999 population projections of Statistics Sweden; in 2005, on the LMS for an individual born in 1940 from the 2003 projections; in 2007, on the medium mortality scenario (MMS) for an individual born in 1943 from the 2006 projections; and in 2010, on the MMS for an individual born in 1946 from the 2009 population projections. These are the closest age-cohorts used by Statistics Sweden.

The rate of interest for the guarantee benefit was lowered in 2005 to 2.75 percent (2.45 percent effective) and was further lowered to zero percent (minus 0.1 percent effective) in 2007, while the more conservative mortality table continued to be used. For a person aged 65 and retiring in 2009 with the same account balance of 5,000 SEK, the guaranteed benefit would amount to only 210 SEK. The initial benefit would be equal to 305 SEK, based on an annuity factor of 16.38 (Swedish Pensions Agency 2010). Thus, the guaranteed benefit would equal 69 percent of the initial benefit.

**Table B.4: Evolution of Annuity Income in the PPM Participating Annuity**

Year	Age	Balance	Annuity Factor	Annuity Income	Investment Income	Operating Fees	Survival Credits
2002	65	5,000	13.87	360	187	14	57
2003	66	4,869	14.83	328	157	14	57
2004	67	4,740	14.35	330	221	12	71
2005	68	4,690	14.57	322	234	10	68
2006	69	4,660	14.13	330	270	7	74
2007	70	4,667	13.41	348	255	7	73
2008	71	4,640	12.90	360	97	9	76
2009	72	4,443	12.37	359	46	11	83
2010	73	4,202	12.26	343		10	66

Source: SPA

So far the guarantees have not been activated for this cohort of retirees, although they came close to activation in 2005. When the guarantees are activated, the minimum benefits will be deducted from the accounts of the annuitants. This implies that annuitants will pay for the guarantees with their own funds but when the balances are exhausted, the SPA will pay for the guaranteed benefits from its own reserves for the remainder of their lives. One weakness of this annuity is that the guaranteed benefits are not indexed to inflation. Even a modest rate of inflation of 3 percent per year will cause a significant erosion of their real value.

**Table B.5: Determinants of the PPM Participating Annuity**

Year	Age	AIR	Assumed Cost	Investment Return	Annual Fee	Mortality Rate	Implied Period
2002	65	4.0%	0.30%	3.9%	0.30%	1.18%	18.80
2003	66	3.0%	0.30%	3.3%	0.30%	1.22%	19.20
2004	67	3.0%	0.30%	4.8%	0.27%	1.55%	18.38
2005	68	3.0%	0.30%	5.2%	0.22%	1.50%	18.75
2006	69	3.0%	0.30%	6.0%	0.16%	1.64%	18.01
2007	70	2.3%	0.10%	5.7%	0.16%	1.64%	15.80
2008	71	2.3%	0.10%	2.2%	0.20%	1.69%	15.08
2009	72	2.3%	0.10%	1.1%	0.25%	1.94%	14.35
2010	73	2.3%	0.10%		0.24%	1.63%	14.20

Source: SPA

## B.6 Concluding Remarks

This Annex provides a brief explanation of the mechanics of the two types of PPM annuities. The novel feature of these annuities is the treatment of longevity risk, which is shared among annuitants on an age cohort basis. The managers of the PPM pillar have considerable discretion in changing the basic determinants of benefit payments. These have been regularly modified as experience has been gained. There are clearly large economies of scale and significant benefits from being able to use a

large pool of annuitants as well as from avoiding wasteful marketing costs. The public status of the SPA inspires greater confidence in the integrity of both its objectives and its implementation policies.

But there are also some disadvantages. Other than the option of using joint life annuities, annuitants do not have the option of leaving bequests to their children or grandchildren or other beneficiaries. They also do not have the option of using lump sums, term annuities or phased withdrawals. The SPA has not so far experimented with creating special risk pools for annuitants with impaired health.

The high exposure to equities and the concomitant wide fluctuation of investment returns of the unit-linked annuity is not necessarily a disadvantage. It reflects the choices of individual participants and the small supplementary nature of the scheme. If the scheme was significantly larger, such high exposure would have been deemed excessive and perhaps a major disadvantage. But if the scheme was much larger, annuitants would most probably have selected funds with more stable net asset values.

Two main points may be relevant for other countries that consider the use of participating or unit-linked variable payout annuities for their mandatory pension pillars. First, the AIR used to calculate initial payments does not need to be the same as the rate of interest used to compute minimum guaranteed benefits. And, second, except for the computation of guaranteed benefits, the mortality tables do not need to be very conservative when the longevity risk is assumed by the retirees and annuity factors are adjusted annually on an age cohort basis.

## Annex C

### The Benefit Guarantees Offered by US-style Variable Annuities

#### C.1 Definition

Variable annuities in the United States are deferred annuities that are used extensively during the accumulation stage in order to benefit from the tax advantages bestowed on them. They are in fact unit-linked investment products that are offered with a wide range of optional guarantees, covering minimum death, accumulation, income and withdrawal benefits. They also have an option to annuitize, which is exercised in less than 20 percent of cases. Variable annuity assets exceeded USD 1.4 trillion in 2008 (about 10 percent of GDP) and have surpassed the assets backing fixed annuities by a wide margin.

In recent years, US-style variable annuities have spread to Canada, Asia and Europe, including apparently Hungary and Poland among Central and Eastern European countries.<sup>38</sup> However, the volume of business is still small in European countries and the products are offered from offshore centers, especially Dublin. The 2008 global financial crisis and the large increase in stock market volatility have caused a setback in variable annuity sales.

#### C.2 Types of Guaranteed Benefits

The distinguishing features of US-style variable annuities are the allowance of flexible withdrawals and the offer of several guarantees. Withdrawals are permitted during both the accumulation and decumulation phases, subject to surrender charges that are imposed on a declining scale for the first few years after purchase to recoup the hefty commercial costs involved. This imparts greater liquidity and flexibility to fund management and addresses the growing concern of investors about the rising cost of long-term care.

The offer of guarantees may only apply to the accumulation phase, or may also cover the payout stage but without requiring annuitization, or may even apply to the payout stage with annuitization. The guaranteed benefits incur charges which, even when they are transparent, are not easy to evaluate. The charges are clearly higher when potentially more generous options are offered to policyholders. Benefits are calculated on reduced values when withdrawals are made. The guaranteed benefits, which can be tailored to meet the varying needs of investors, include the following:

**Guaranteed Minimum Accumulation Benefit (GMAB).** This guarantees a minimum capital accumulation for a given premium at a future date or dates. The simplest form is a return of paid premiums without any investment income. Other forms include the premium increased at a specified roll-up rate, the premium linked to inflation, or the ratchet value, given by the highest accumulation value attained at a contract anniversary.

The guarantee returning the nominal value of premiums is not worth much, especially over long periods and in the presence of even moderate inflation. On the other hand, roll-up or ratchet values could be more valuable although they are also likely to cost much more.

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<sup>38</sup> The rapid expansion of US-style variable annuities in Canada, especially those with guaranteed lifetime withdrawal benefits, is discussed in Milevsky and Shao (2010).



**Guaranteed Minimum Death Benefit (GMDB).** This provides a minimum benefit upon death. It is generally paid during the accumulation phase but may also apply to the early part of the annuitization phase. It is usually a rebate of premiums paid, or premiums with investment income at a specified roll-up rate, or the accumulated value of the account at the time of death, whichever is higher. The guaranteed sum is adjusted for any withdrawals. The benefit may also be set at the ratchet value.

Again, like for the accumulation benefit, this guarantee may or may not represent good value. In general, insurers tend to overcharge for this benefit, exploiting the need of policyholders for family protection.

**Guaranteed Minimum Withdrawal Benefit (GMWB).** This provides a minimum withdrawal benefit for a specified number of years. The withdrawal benefit is set as a percentage of the guaranteed amount at the time this option is selected, i.e., it can be based on the value of the paid premium, the roll-up value, or the ratchet value. It continues for the specified number of years even if the account balance is exhausted. Upon death of the contract holder, any remaining account balance is included in the estate of the deceased.

**Lifetime Guaranteed Minimum Withdrawal Benefit (LGMWB).** This is a more recent variation of the above and provides a minimum withdrawal benefit for life. It can be calculated in the same ways as the GMWB, i.e., it can be based on the value of the paid premium, the roll-up value, or the ratchet value. The value of the guarantee depends on the level of the minimum withdrawal benefit, the volatility of investment returns, and the fees charged by the providers.

This benefit is paid for life but is not a life annuity. It differs from the latter in that the account balance does not benefit from survival credits while, upon the death of the account holder, any remaining balance is included in the estate of the deceased. It represents an interesting compromise between the conflicting objectives of longevity insurance with income security, on the one hand, and the demand for investment flexibility with long-run potential and the bequest motive, on the other.

An interesting implication of the guaranteed living benefits offered by US-style variable annuities is that the cost of longevity insurance is paid by the living participants through the guarantee fees that are assessed on them. In contrast, in the case of traditional life annuities, the cost of longevity insurance is borne in an ex post sense by the dying annuitants.

Since their introduction, variable annuities offering lifetime guaranteed minimum withdrawal benefits have been expanding at a rapid pace in both the United States and Canada. They seem to address both the need for flexibility and liquidity and the bequest motive of annuitants. Recent research has highlighted the importance of both the need to provide for the growing cost of long-term care, which is a crucial driver of precautionary savings, and the bequest motive, which continues to be strong and prevalent among large sections of the population (Ameriks et al, 2011). However, pricing and hedging the guarantees face considerable difficulties because actuaries have to project economic mortality risk linked not just to income and wealth but to the account balance of annuitants and the level and type of the guaranteed lifelong benefits.

**Guaranteed Minimum Income Benefit (GMIB).** This provides a minimum income in the payout phase through annuitization. It is effectively a guaranteed lifetime annuity option where the conversion rate is fixed at the time the premium is paid. Contract terms may include guaranteed periods of payment, a death benefit in cases of early death in the payout phase, and the possibility of regular premiums.

The guaranteed conversion rate for additional premiums reflects prevailing market conditions at the time the additional premiums are paid. In general, the conversion rate is calculated at an AIR that is below market levels, while a conservative mortality table is also applied. At the time when the annuitization option can be exercised, policy holders have the right to select between the GMIB or an annuity purchased at then current rates or to let the option expire.

Once the annuitization option is exercised, the payout annuity may take the form of a fixed annuity at the guaranteed level or at another level negotiated at that time or it may take the form of a unit-linked payout annuity, subject to a **guaranteed payout annuity floor (GPAF)**. The latter guarantees a minimum benefit during the payout phase and may involve restrictions on asset allocation, limiting selection to a few designated funds and also requiring periodic rebalancing (Dellinger 2006). Of course, annuitants may also select a unit-linked VPA without any guarantees.

### C.3 Regulatory Issues

The offer of US-style VAs (and VPAs) with guarantees presupposes effective access to hedging facilities through the use of various derivative products, including equity options and interest rate swaps. The guarantees incur charges that are higher for more generous benefits and reflect the cost of hedging and the cost of capital and profit for the providers as well as asset management fees and various account maintenance and administration expenses.

The pricing and reserving policies of these policies raise complex issues. Their offer entails major risk management challenges and requires the use of dynamic hedging programs and sophisticated asset liability models. A particular difficulty is created by the offer of various options to policyholders. Developing models that provide accurate predictions of the future behavior of policyholders in response to changing market conditions has been a very difficult challenge.

Rigidly regulating the prices of the various guarantees offered by these products would be inconceivable. Even requiring a high level of transparency would not be very helpful without a clear framework for evaluating the value of such guarantees. The most that could be envisaged would be a regulation capping the spread over the actual cost of hedging that providers could pass on to annuitants. But this would imply a variable fee for covering these costs, which may be even more difficult to monitor and police effectively.

At present, most providers charge a fixed fee that covers the cost of all the guarantees included in a contract. However, providers vary the asset management fees charged on the various underlying funds when they are concerned about their growing exposure to particular asset classes. These fees, which are subject to short notice requirements, aim to encourage policyholders to switch to other funds. Available data show a very wide dispersion of total insurance and investment fees that may range from 1 to 5 percent (Milevsky and Shao 2010)

Acquisition costs, which mainly include hefty commissions paid to selling brokers, also are an important expense component. Policyholders are subject to declining surrender charges for a period ranging from four to seven years. In the US, 80 percent of sales of VAs are from exchanged policies as policyholders seek newer products with more attractive features once the surrender charge period is over (Sigma 2008). They are encouraged in this by brokers who are anxious to increase their commission income.

This feature as well as higher volatility in financial markets tend to increase the costs of offering these products. However, the complexity of VA policies impedes comparability of both benefits and charges and allows providers to pass higher costs to consumers. The US Securities and Exchange Commission, which regulates VAs alongside state insurance regulators, has issued a guide in which it warns consumers that they do pay for each benefit provided by a variable annuity policy and advises them to understand the charges, consider carefully if they need the benefit, and whether they can obtain it more cheaply through a separate product (SEC 2010).

ConsumerReports.org notes in an openly accessible website feature that variable annuities have long had a tarnished reputation among personal-finance experts in the United States because of the aggressive sales tactics, exorbitant fees, and confusing terms associated with them. While it acknowledges that variable annuities with lifetime guaranteed minimum benefits performed well in the recent financial crisis, it concludes that variable annuities are best for people who have a very high income and have maxed out their other retirement accounts (Consumer Reports 2009).

Reserving policies for variable annuities with guarantees are particularly challenging. This is an issue that has not been fully resolved yet, but recent experience suggests that the most effective approach in ensuring the solvency of providers and their ability to honor their commitments is to require effective use of dynamic hedging programs.

This has been underscored by the large losses that were recently suffered by ManuLife Financial, the Canadian insurer, which decided in 2004 to terminate hedging the equity positions it held in its variable annuity business. This approach boosted profits for a number of years but generated large losses when markets collapsed in 2008 (Perkins 2008).

Large increases in market volatility raise the cost of hedging but failure to hedge may give rise to much bigger problems. However, the effectiveness of hedging programs may itself come into question when financial markets suffer serious turmoil and volatility reaches very high levels. Hedging markets withstood the global crisis of 2008 but there is no certainty that they would have been able to survive without the massive support that was then provided to the financial markets as well as to leading individual financial institutions by the governments and central banks of the largest countries in the world.

In the aftermath of the 2008 global financial crisis various proposals have been advanced to make hedging compulsory and to require the use of standardized, exchange-traded hedging products. The former would prevent the large exposure of providers to sudden changes in market volatility, while the latter would contain their exposure to counterparty risk, which can be very significant in customized derivatives that are traded on over-the-counter (OTC) markets. However, both suggestions face serious practical difficulties. Compulsory hedging needs to allow for the use of natural hedges, such as the parallel offer of equity-linked life insurance and lifetime guaranteed minimum withdrawal benefits, while the use of standardized, exchange-traded products may lack the flexibility to handle the lapse and surrender behavior of policyholders. Regulators would need to monitor closely the exposure of providers to counterparty risk and also to evaluate carefully provider models that aim to predict the likely behavior of policy holders in exercising the various options offered to them.

The regulatory issues raised by variable annuities with a wide range of guarantees are currently under study by the Committee of European Insurance and Occupational Pension Supervisors (CEIOPS), now the European Insurance and Occupational Pension Authority (EIOPA), which also plays a

leading role in the development of the new Solvency II regime for insurance operations. A working party of experts, that was appointed to study this topic, circulated its report in November 2010 (CEIOPS 2010), for public comment and discussion.

Given the complexity of the regulatory issues and the need to have access to well-developed and efficient securities and hedging markets, it is fair to conclude that US-style variable annuities with a wide range of optional guarantees should not be included in the menu of retirement products that are authorized for the mandatory second pillar of middle and low-income countries. Such products could of course be made available to voluntary savings.

## References

- Ameriks, John, Andrew Caplin, Steven Laufer and Stijn van Nieuwerburgh. 2011. 'The Joy of Giving or Assisted Living? Using Strategic Surveys to Separate Public Care Aversion from Bequest Motives', *The Journal of Finance*, Vol. LXVI, No 2., April, pp 519-561.
- Andersen, Carsten and Peter Skjodt. 2007. 'Pension Institutions and Annuities in Denmark', Policy Research Working Paper No. 4437. Washington, D.C.: The World Bank.
- Ballotta, Laura, Steven Haberman and Nan Wang. 2006. 'Guarantees in With-Profit and Unitized With-Profit Life Insurance Contracts: Fair Valuation Problem in Presence of the Default Option'. *Journal of Risk and Insurance*, 73:97-121.
- Blake, David. 2001. "The United Kingdom Pension System: Key Issues". Pensions Institute. London: Birkbeck College.
- CEIOPS (Committee of European Insurance and Occupational Pension Supervisors). 2010. Draft Report on Variable Annuities. Consultation Paper No. 83.
- Cummins, David J., Kristian R. Miltersen and Svein-Arne Persson. 2007. 'International Comparison of Interest Rate Guarantees in Life Insurance Contracts', Department of Finance and Management Science, The Norwegian School of Economics, Oslo.
- Dellinger, Jeffrey K. 2006. *The Handbook of Variable Income Annuities*. Hoboken, New Jersey: John Wiley & Sons.
- Evans, David. 2010. "Fallen Soldiers' Families Denied Cash as Insurers Profit". *Bloomberg Magazine*, 2010 07 28.
- Feuer, Philip J. 1969. 'Discussion of Macarchuk Paper', *Transactions of Society of Actuaries*, Vol. 21 Pt 1 No.61.
- Fowler, Mark S. 2010. 'The Self-Supporting Annuity Fund - A Technical Note', mimeo.
- Grossen, Anders and Peter L. Jorgensen. 2000. 'Fair Valuation of Life Insurance Liabilities: The Impact of Interest Rate Guarantees, Surrender Options, and Bonus Policies', *Insurance Mathematics and Economics*, 26:37-57.
- Grossen, Anders and Peter L. Jorgensen. 2002. 'The Bonus-Crediting Mechanism of Danish Pension and Life Insurance Companies: An Empirical Analysis', *Journal of Pension Economics and Finance*, 1(3):249-269.
- Hansen, Mette and Kristian R. Miltersen. 2002. 'Minimum Rate of Return Guarantees: The Danish Case', *Scandinavian Actuarial Journal*, 2002(4):280-318.

Kaschutzke, Barbara and Raimond Maurer. 2010. 'The Private Life Annuity Market in Germany: Products and Money's Worth Ratios'. Pension Research Council Working Paper PRC WP 2010-20. Philadelphia: Pension Research Council.

Leondis, Alexis. 2010. 'MassMutual Skips Retained Accounts, Cuts Beneficiaries a Check'. Bloomberg, 2010 08 06.

Macarchuk, John. 1969. 'Some Observations on the Actuarial Aspects of the Insured Variable Annuity', *Transactions of Society of Actuaries*, Vol. 21 Pt 1 No.61.

Milevsky, Moshe A. 2002. 'How to Completely Avoid Outliving Your Money: An Introduction to Variable Payout Annuities for Retiring Canadians', *Schulich School of Business*, York University.

Milevsky, Moshe A. and Ling-wu Shao. 2010. 'Annuities and their Derivatives: The Recent Canadian Experience'. Pension Research Council Working Paper PRC WP 2010-16. Philadelphia: Pension Research Council.

Miltersen, Kristian R. and Svein-Arne Persson. 2003. 'Guaranteed Investment Contracts: Distributed and Undistributed Excess Return'. *Scandinavian Actuarial Journal*, 2003(4):257-279.

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

Perkins, Tara. 2008. "Dominic's End Game", *Globe and Mail*, 2008 12 05.

Reyes, Gonzalo and Fiona Stewart. 2008. "Transparency and Competition in the Choice of Pension Products: The Chilean and UK Experience", Working Paper No. 7, International Organization of Pension Supervisors.

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

Rocha, Roberto and Dimitri Vitas. 2010. 'Designing the Payout Phase of Pension Systems: Policy Issues and Constraints', Policy Research Working Paper No. 5289. Washington, D.C.: The World Bank.

Rocha, Roberto, Dimitri Vitas and Heinz Rudolph. 2011. *Annuities and Other Retirement Products: Designing the Payout Phase*. Washington, D.C.: The World Bank.

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

Swedish Pensions Agency. 2010. *The Orange Report - Annual Report of the Swedish Pension System 2009*. Stockholm: SPA.

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. 2010. 'Designing the Payout Phase of Funded Pension Pillars in Central and Eastern European Countries', Policy Research Working Paper No. 5276. Washington, D.C.: The World Bank.

Von Gaudecker, Hans-Martin and Carsten Weber. 2004. 'Surprises in a Growing Market Niche: An Evaluation of the German Private Life Annuities Market', Geneva Papers on Risk and Insurance, 29:394-416.