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ABSTRACT/RÉSUMÉ

Funding regulations and Risk Sharing

This paper provides a description of the risk-sharing features of pension plan design in selected OECD and non-OECD countries and how they correspond with the funding rules applied to pension funds. In addition to leading to a better understanding of differences in funding rules across countries with developed pension fund systems, the study considers the trend towards risk-based regulation. While the document does not enter the debate over the application of risk-based quantitative funding requirements to pension funds (as under Basel II or Solvency II), it identifies the risk factors that should be evaluated and considered in a comprehensive risk-based regulatory approach, whether prescriptive or principles-based. The three main risk factors identified are the nature of risks and the guarantees offered under different plans designs, the extent to which benefits are conditional and can be adjusted, and the extent to which contributions may be raised to cover any funding gap. In addition, the strength of the guarantee or covenant from the sponsoring employer(s) and of insolvency guarantee arrangements should be carefully assessed when designing funding requirements.

JEL codes: G23, J32
Keywords: Pension funds, defined benefit, hybrid plans, defined contribution, funding, risk sharing, fair value.

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Réglementation de la capitalisation et partage des risques

Ce document décrit les caractéristiques de la conception des plans de retraite dans un certain nombre de pays appartenant ou non à l'OCDE en se plaçant sous l'angle du partage des risques. Il vérifie en outre si ces caractéristiques correspondent aux règles de capitalisation applicables aux fonds de pension. Au-delà de sa contribution à la connaissance des différences entre les règles de capitalisation dans les pays dotés de systèmes développés de fonds de pension, l'étude examine la tendance à l'adoption de règles fondées sur les risques. Même si le document n'entre pas dans le débat sur l'application de normes quantitatives de capitalisation en fonction des risques (comme le font Bâle II ou Solvabilité II), il identifie les facteurs de risques qui doivent être évalués et examinés dans le cadre d'une démarche globale de la réglementation fondée sur les risques, que cette démarche soit prescriptive ou qu'elle repose sur des principes. Les trois principaux facteurs de risques identifiés sont la nature des risques et les garanties proposées par les différents concepts de plans, la conditionnalité et les possibilités d'ajustement des prestations, et les possibilités de relèvement des cotisations en cas de capitalisation insuffisante. En outre, il convient d'évaluer soigneusement la solidité de la garantie ou des engagements relevant de la responsabilité du ou des employeurs à l'initiative du plan lors de la mise au point des conditions de capitalisation.

Codes JEL: G23, J32
Mots clés: fonds de pension, prestations définies, plans hybrides, cotisations définies, capitalisation, partage des risques, juste valeur.

FUNDING REGULATIONS AND RISK-SHARING

by Colin Pugh and Juan Yermo[1]

Executive summary

This paper develops one aspect of the project of the ÒECD Working Party on Private Pensions on the efficiency and effectiveness of private pension regulation, namely the funding of defined benefit (DB) and other pension plans with benefit (or return) promises and its interaction with the risk sharing features of these plans.

The study starts from the basic premise that funding regulations should promote high levels of benefit security at a reasonable cost to members, sponsoring employers and other stakeholders. As a result, funding regulations should take into account the nature of benefit promises, and in particular the specific risks being guaranteed, and the way those are shared between the different stakeholders. Policymakers should also consider the impact that changes in accounting and tax rules may have on employers' willingness to sponsor occupational pension plans with promises.

At the same time, there are other regulations, grouped under the generic goal of protection of the rights of members and beneficiaries, that affect directly the nature of the benefit promise itself, such as regulations over vesting, portability, indexation as well as statutory minimum benefits and investment return requirements.

The trade-off between benefit security and cost is one that requires careful analysis and is obviously being resolved in different ways across countries. It is not possible to define an ideal model of funding regulations or member protection requirements. However, policymakers should at least consider the impact of regulations on sponsor's willingness to sponsor different kinds of pension arrangements. Certain regulations may hamper the development of plan designs which offer a level of benefit security between traditional defined benefit ones and "pure" defined contribution arrangements. Such plans, which are grouped under the generic name of hybrid DB arrangements, share risks between sponsors and employees

[1] Colin Pugh is an independent consultant and Juan Yermo is principal administrator in the Financial Affairs Division of the OECD's Directorate for Financial and Enterprise Affairs. This report is part of a collaborative research effort with Allianz Global Investors and risklab germany on risk-based regulation. The authors would like to thank delegates to the OECD Working Party on Private Pensions for useful comments, and in particular Leena Väänänen (Ministry of Social Affairs and Health, Finland) and Junichi Sakamoto (Nomura Research Institute, Japan) who provided the information on Finland and Japan, respectively, contained in this paper. Useful comments on earlier versions of this paper were received from Brigitte Miksa (Allianz GI), Gerhard Scheuenstuhl (risklab germany), and a group of external project advisers, including John Ashcroft (independent consultant), Ron Gebhardtsbauer (US Senate Finance Committee), Con Keating (BrightonRock), Niels Kortleve (PGGM, Netherlands) and Barthold Kuipers (ABP, Netherlands). The views expressed herein are those of the authors and do not necessarily reflect those of the OECD or the governments of its Member countries. The authors are solely responsible for any errors.

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or between different cohorts of workers. Examples of such hybrid DB plans include cash balance and conditional indexation plans. From the perspective of plan members, hybrid DB plans are a priori superior to "pure" DC arrangements as they reduce the uncertainty over benefit levels inherent to the latter.

The study provides a description of the risk-sharing features of pension plan design in selected OECD and non-OECD countries and how they correspond with the funding rules applied to pension funds. In addition to leading to a better understanding of differences in funding rules across countries with developed pension fund systems, the study considers the trend towards risk-based regulation. While the document does not enter the debate over the application of risk-based quantitative funding requirements to pension funds (as under Basel II or Solvency II) and does not address cross-border issues, it identifies the risk factors that should be evaluated and considered in a comprehensive risk-based regulatory approach, whether prescriptive or principles-based.

The three main risk factors identified are the nature of risks and the guarantees offered under different plans designs (with risks falling under three main groups - market, biometric, and operational risks), the extent to which benefits are conditional or can be reduced, and the extent to which contributions may be raised to cover any funding gap. In addition, the strength of the guarantee or covenant from the sponsoring employer(s) and of insolvency guarantee arrangements should be carefully assessed when designing funding requirements. One important implication from this approach is that plans with strong risk sharing features (for example, conditional indexation, nominal benefit cuts as last recourse, and flexible contribution policies) may have lower funding needs than traditional DB arrangements with mandatory indexation.

This document could be followed with more specific recommendations regarding the design of funding rules, in line with the project on regulatory efficiency and effectiveness. Another area for possible future research is intergenerational risk sharing and the implications for pension regulations. While in many countries plan sponsors act as providers of financing and guarantors of benefits, pension costs to employers are in the long-term transferred to employees via lower wage settlements. Hence, ultimately pension-related risks are also being redistributed across different generations of workers. Making such intergenerational risk sharing more explicit and transparent can help policymakers design better regulations.

I. Introduction

In April this year the OECD Council approved the Recommendation on Guidelines on Funding and Benefit Security in Occupational Pension Plans which were developed by the Working Party on Private Pensions. These guidelines set out basic requirements for the funding of pension promises in occupational pension plans.

In practice, funding regulations show a high variation across countries, with some allowing for relatively long periods of underfunding, up to 7 years in many cases, (e.g. Austria, Canada, Finland, Ireland, Japan, Portugal, South Africa, Switzerland, United Kingdom and the United States) while others require the build-up of buffers or solvency margins on an on-going basis and a much quicker recovery to full-funding levels (e.g. Denmark, Finland, Germany, Iceland, Netherlands, Norway and Sweden).

These two basic country groupings roughly coincide with the two main types of plan, the former group being that of traditional DB arrangements (mainly final pay), where benefits are underwritten by sponsoring employers, while in the second group pension funds tend to be more detached from sponsoring employer. In some of the countries of this second group pension funds directly underwrite benefits and do

not benefit from an employer guarantee.[2] Another important and related distinction between these two groups is that in the former, pension funds are not established or regulated as life insurance undertakings while in the latter group pension funds are either a form of life insurance undertaking (industry-wide funds in Denmark, *Pensionskassen* in Germany, and pension insurance companies in Finland, Norway and Sweden) or are regulated in a somewhat similar way to insurance companies (pension funds in Finland, Iceland, Netherlands and Norway).

Occupational pension plans also differ in the extent to which the benefit promises made are irrevocable and whether employees also contribute to the plan. In some countries, benefits can be adjusted in line with some measure of the financial strength of the pension fund or the sponsor. For example, in the Netherlands, the indexation of accrued benefits and pensions in payment is linked to the funding level of the pension fund. This introduces a form of risk sharing between the plan sponsors and beneficiaries. An even more flexible arrangement exists in Japan and Portugal for DB plans. Even nominal, accrued benefits can be adjusted if the pension fund is in financial difficulties (Portugal) or if both the pension fund and the sponsoring company are in financial difficulties (Japan). With the consent of the plan members, the plan sponsor and the regulator, it is also possible to reduce accrued benefits in the Netherlands. In the United States, pension plans must reduce or eliminate lump sums (and freeze benefits) if not well funded, and Multi-Employer plans can reduce various benefits if not well-funded.

Risk-sharing can also be implemented via the contribution policy. In contributory DB plans, employers and employees may share the risk of underfunding of any pension promises. Risks may also be distributed among specific categories of workers. For example, most DB pension plans have waiting and vesting periods, before which departing workers may not earn any pension rights. These plan features shift pension risks from long to short-tenure employees. There is also the more complex subject of inter-generational risk sharing, i.e. the transfer of risks between different generations of plan members and beneficiaries and plan sponsor shareholders. Any pension plan that offers some type of benefit promise in effect involves an intergenerational contract, whereby future workers and shareholders share some of the cost of meeting that promise. Although this document does not attempt to address the issue, it deserves further research.

Pension plan regulations can alter these risk sharing arrangements and shift risks in one or other direction. For example, mandatory indexation requirements for DB plans in the United Kingdom (5% for benefits accrued prior to 2005, 2.5% thereafter), have turned a "soft" promise into a statutory right of beneficiaries and shifted part of the indexation risk (up to the cap) to sponsoring employers. The opposite shift has taken place in some countries such as Italy, Hungary or Poland, where occupational DB plans are not allowed. In countries such as Italy where voluntary pension plans can only be pure DC, risks are borne solely by the beneficiaries.

Although insurance contracts are an allowed alternative to pension funds in many countries, it should be noted that the regulation of *insured* pension contracts is not within the scope of this paper or the project. Fully insured contracts are now to be found in only a handful of countries. In these countries and elsewhere, insurance companies are becoming increasingly reticent to take on mortality, investment and other pension risks and are moving rapidly to offering unbundled investment management, actuarial, administrative and other services. They generally offer completely individualized, segregated funds to their larger clients and unit-linked funds to their small and medium-sized clients. In many countries, there is a direct contractual relationship between the plan sponsor and the insurance company, as such arrangements are permitted in lieu of establishing a trust, pension foundation or equivalent funding entity.

[2] In Germany and Norway pension insurance companies can underwrite benefit promises but benefits are also ultimately guaranteed by sponsoring employers.

Unless otherwise indicated, this paper will focus on conventional pension funds established through pension entities other than insurance companies.[3]

The document is divided as follows. Section II presents the main types of pension plans, focusing on their risk sharing features. Section III discusses the impact of regulations on plan design, covering both regulations that have a direct impact as well as those that indirectly affect the choice of pension plan. Section IV takes the opposite approach, analysing how funding regulations may take account of plan design and risk sharing features in order to ensure adequate funding, and hence high levels of benefit security, without impeding the operation of flexible plan designs. Section V concludes. Specific country information is contained in the annex. Annex I has comparative information on funding rules while Annex II describes in detail regulations that directly affect plan design.

II. Plan design and the nature of risk sharing

The OECD classification (OECD 2005)) identifies two main types of occupational pension plan, defined benefit (DB) and defined contribution (DC). Under defined contribution plans the plan sponsor pays fixed contributions (usually a percentage of salaries) and has no legal or constructive obligation to pay further contributions to an ongoing plan in the event of unfavourable plan experience. Defined benefit plans are classified by default, as plans other than defined contribution ones. This classification follows that of International Financial Reporting Standards (IFRS), under IAS19. The OECD classification provides a further breakdown of these two basic categories which allows a more precise understanding of the nature of the benefit promise and of risk sharing within DB[4] and DC plans:

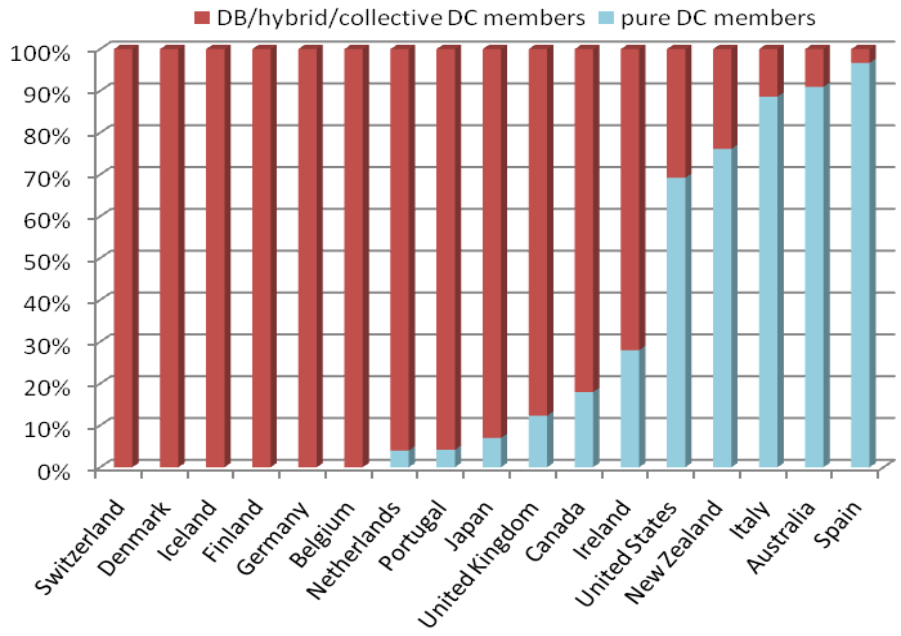
- Traditional DB.
- Hybrid DB
- Protected DC (including collective DC plans)
- Unprotected or "pure" DC

Figure 1 groups occupational pension plan members in selected OECD countries into two main categories: plans with promises, including traditional DB, hybrid DB and collective DC, and "pure" (or unprotected) DC on the other, where all plan risks are transferred to the member during the accumulation stage. A large number of OECD countries rely mainly on the former type of plans. However, some countries are experiencing rapid changes in plan provision. For example, in the United Kingdom, a large part of private sector workers that are members of DB pension plans belong to plans that are closed to new entrants.

[3] For Germany, the paper focuses on *Pensionskassen* and *Pensionsfonds*. The former are actually a type of insurance company.

[4] The OECD Taxonomy includes a third category of DB plans, so-called mixed DB plans, which have two separate DB and DC components within the same plan.

Figure 1. Main type of occupational pension plans in OECD countries (2006)



Source: OECD Global Pension Statistics

Traditional DB plans

Traditional DB plans are those where benefits are linked through a formula to the members' wages or salaries, length of employment, or other factors. Originally, DB plans used to be based on a final-pay formula, the benefit being calculated as the product of a percentage (the so-called accrual rate) of the worker's salary in the last year (or few years) before retirement and the number of years of service. In some countries, career-average plans had also been popular in the distant past, and they are now seeing a resurgence in some countries such as the Netherlands, though in a hybrid form (see below). Under "traditional" career-average plans, accrued benefits are calculated using the average of past wages revalued with a measure of the cost of living or average wages. Different benefit accrual formulas lead to different forms of risk sharing.

Traditional DB plans usually pay benefits in the form of annuities, may adjust benefits in payment to the cost of living (indexation), and have traditionally offered generous early retirement provisions. Discretionary benefit improvements and contribution holidays were also common in the past whenever the plans accumulated large surpluses.

Under traditional DB plans, risks are laid largely on the sponsoring employer. Even in the countries where employees contribute to such plans, their contribution rates tend to be fixed while those of the plan sponsor vary with the plan's funding needs. An exception is the Netherlands, where employees' contribution rates in some plans may also be changed if needed. This risk sharing feature, among others, may explain the durability of DB plans in the Netherlands. Employee contribution rates can also be changed in other countries, like the United Kingdom, subject to all the necessary agreements.

Hybrid DB plans

The extent of risk-sharing varies across the different types of hybrid plans. Some hybrid plans introduced recently in OECD countries may have actually led to a higher level of risk for the plan sponsor. There are four main types of hybrid plans:

- *Conditional benefit plans*: benefits are calculated as in a traditional defined benefit plan but there is an element of conditionality tied to the performance of the fund, the member's longevity expectations or other factors. For example, conditional indexation plans are those where the revaluation of past wages (used to calculate benefit accruals) and the indexation of benefits in payment is tied to some measure of the plan's financial strength. Other variations of these conditional DB plans are those where the benefits or the retirement age are automatically linked to improvements in life expectancy.

- *Cash balance plans*: benefits are calculated on the basis of a notional individual account that earns a specified rate of return, which can be a fixed percentage, the return on an index tracker fund, or the return on several funds selected by participants (plan assets do not necessarily have to be invested in those funds). Benefits may be paid as a lump-sum or converted into an annuity.

- *Nursery plans*: benefits are calculated on a DC basis up to a certain age and on a DB basis thereafter.

- *Floor or underpin plans*: benefits are the higher of a DC and a DB formula.

Of all four kinds of hybrids, conditional benefit plans may present the lowest risks for plan sponsors as benefits can be adjusted with the plan's financial situation. Such plans have become popular in the Netherlands in recent years. Cash balance plans also lower risks to sponsors relative to traditional defined benefit plans, since the interest credit is generally modest and the initial pension amount is normally adjusted for longevity and interest rates at retirement. The risks borne by sponsors are even lower wherever participants choose lump sum distributions as opposed as annuity-like payments. Cash balance plans are common in Japan and the United States, where they have replaced traditional DB arrangements. The Swiss occupational pension system may also be considered a type of cash balance arrangement, though some plan sponsors have been able to account for their plans under the DC classification of IAS19.[5]

Under cash balance plans longevity risk is borne by the participant until retirement (i.e., if, while working, expected life spans increase, employees will be charged higher annuity prices when they retire), while pre-retirement investment risk is borne by the plan sponsor. At retirement, the participant normally bears the risk of the available annuity conversion rates being expensive due to low interest rates at time of purchase. If the annuity option is taken, post-retirement investment and longevity risk may be borne by the sponsor (if the plan guarantees a fixed annuity conversion rate or if it is self-annuitising) or may be shifted to an insurance company via the purchase of annuities. The investment risk (and reward) can also be taken by employees if they can choose a variable annuity.

Under nursery plans, plan sponsors bear investment and longevity risks only from the age at which benefits start being calculated on a traditional DB basis. Unless this age is high, sponsors will bear added risk in these plans relative to cash balance arrangements.

[5] If there is no employer obligation other than paying the fixed contribution rate, such plans would be considered protected ("collective") DC under the OECD classification. Cash balance plans that pay benefits in the form of annuities using fixed annuity rates (as in Switzerland) are also equivalent to indexed career-average earnings plans.

Finally, in floor or underpin plans, plan sponsors bear both investment and longevity risks, just as in DB arrangements, while participants bear only upside risk potential in the form of higher benefits if the DC formula turns out more favourable than the DB one. For a given level of DB benefits, such arrangements are clearly more costly for employers than a traditional DB plan, as benefits may never be lower than those guaranteed under the DB formula and may be higher if the DC accumulation formula yields a higher benefit.

Protected DC plans

Protected occupational DC plans are those where the pension entity or provider guarantees or targets a specific rate of return or benefit, but there is no automatic claim to the sponsoring employer in case of underfunding.[6] Protected DC plans include collective DC and insured DC plans. The two are equivalent, the key difference being that a collective DC plan is financed by a pension fund while an insured DC plan is financed by a life insurance company. The main OECD examples of collective DC plans are Denmark and Iceland. The nature of the guarantee is different in these two countries. Pension funds and pension insurance companies in Denmark offer a guaranteed interest rate and annuity conversion rate, plus a variable bonus on the return that depends on investment performance. The guaranteed interest rate can be lowered, but this only affects new entrants to the plan. In Iceland, on the other hand, pension funds guarantee a minimum replacement rate of 56% of the worker's reference wage. Benefits above this minimum level can be lowered. Pension funds react to underfunding caused by negative investment performance by adjusting downwards accrued benefits and pensions in payment, but leaving future benefit accruals unchanged. If the difficulties stem from benefits thought to be too generous given mortality and morbidity rates, the benefit rules for future accruals are changed.

The Netherlands has also started to introduce a small number of so-called collective DC plans, but they are not directly comparable with the arrangements in Denmark and Iceland. Under the Dutch arrangements, as they are currently evolving, they are essentially career-average earnings plans with conditional indexing and a conservative employer contribution rate fixed over a certain time period (usually five years). If the fixed contributions are coupled with favourable investment performance, full or partial indexation will be given. At the other extreme, if the plan experience is particularly unfavourable, future benefits or even accrued benefits could be reduced. These plans are still in the early stages of development, and various questions remain unanswered. In particular, it remains to be seen whether employers will be called to bail out severely underfunded pension funds.

Unprotected or "pure" DC plans

Unprotected occupational DC plans are those where the pension entity or provider does not offer plan members any investment return or benefit guarantee or promise during the accumulation phase. During the retirement phase, however, the member may purchase an annuity which may transfer investment and longevity risks to the provider. The plan sponsor's sole obligation is to pay its fixed contribution rate, and it is not subsequently exposed to any pre-retirement or post-retirement investment, longevity or related risks. They are frequently referred to as "pure" DC plans.

III. The impact of regulations on plan design

Regulations drive plan design in two main ways. Firstly, there are rules that require plans to meet certain design criteria. These have a direct effect on plan design and are discussed next. Other regulations, and in particular funding regulations, while they do not directly restrict the design of plans can nonetheless

[6] Plans where the pension entity or provider guarantee or target a specific rate of return or benefit but where there can be a claim on the sponsoring employer(s) in case of underfunding are treated as hybrid DB plans.

affect it indirectly. This indirect effect may be important in some countries as these types of regulations can increase the cost of certain forms of benefit provision.

Regulations directly mandating aspects of plan design

Although in many countries occupational pension plans are established on a voluntary basis, many countries regulate various aspects of the plan's design. Table 1 describes the types of plans permitted by the law as well as any regulations on minimum returns and benefits. In some countries like Italy, occupational DB plans are not allowed anymore. On the other extreme of the regulatory spectrum, unprotected DC plans are prohibited in Belgium[7], Germany, and Switzerland. In all these countries, regulators impose a minimum rate of return on investments on occupational pension plans (3.75% and 3.25% in Belgium for employee and employer contributions, respectively, and 0% in Germany as at least the contributions promised minus, if applicable, the risk element of contributions must be guaranteed at retirement. From a classification perspective, these rules effectively make all seemingly DC plans in Belgium and Germany DB in nature as employers must guarantee any return or benefit promise. Mandatory occupational pension plans in Switzerland (BVG/LPP) are also subject to a statutory interest rate and annuity conversion rate, but there is less clarity in the legislation over the sponsor's responsibility over these guarantees.

Regulations in some countries also restrict the type of hybrid plans that may be established. For example, in Japan the only type of hybrid DB plans permitted are cash balance plans. Furthermore, the revaluing rate (or interest credit) applied to the accrued balance must be based on one of the following:

- a constant interest rate;
- the average rate of return on sovereign bonds, the rate of growth of wages or the rate of growth of the Consumer Price Index;
- a combination of the two above-mentioned options;
- one of the above-mentioned two rates with a maximum or minimum rate.

Table 1. Plan type regulations in selected OECD countries

Country	Plan type regulations
Australia	All plan types permitted.
Austria	All plan types permitted.
Belgium	Annual minimum return of 3.75% on employees' contributions and 3.25% on employer contributions, guaranteed by sponsoring employers, making all plans underpin DB.
Finland	Accrual rates in the statutory system are fixed giving a 77.5% replacement rate to a full career worker.
Germany	Only DB plans are permitted as employers have to guarantee at least contributions promised minus, if applicable, risk elements of contributions.
Iceland	Minimum 56% replacement rate (based on career average earnings) at 67 with 40

[7] In general the information given for Belgium in the document (unless mentioned otherwise) comes from Belgian social and labour legislation which applies on all Belgian plans (whether administered by insurance companies or pension funds, and whether they are administered in Belgium or abroad). Belgian prudential legislation is purely prudential as foreseen in the European IORP directive (no fixed maximum interest rate, no limits regarding return to the employer, own experience mortality tables, etc).

	years of service.
Ireland	All plan types permitted, but there are specific revaluation requirements for all DB plans (see Table 2).
Italy	No DB plans can be established under the new regulatory framework
Japan	Only hybrid plans permitted are of the cash balance type.
Netherlands	All plan types permitted.
Norway	All plan types permitted.
Spain	All plan types permitted.
Switzerland	Minimum investment return of 2.25% and mandatory annuity conversion rate of 7.1 for men and 7.15 for women (to be gradually reduced to 6.4% between 2008 and 2011).
United Kingdom	All plan types permitted, but there are specific revaluation and indexation requirements for DB plans (see Table 2).
United States	All plan types permitted.

Source: OECD

Regulations in several countries, usually tax regulations, also impose a maximum on either the salary that can be recognized for pension purposes under a qualified pension plan or the maximum annual or lifetime benefit accrual. Examples are Canada, the United Kingdom and the United States, countries where the gap between average and executive salaries continues to widen. The maximum pension accrual under a Canadian pension plan is the lesser of 2 percent of earnings and C$2,333 (for 2008) per year of service. The dollar limit will be increased to C$2,444 for 2009 and will be indexed to average wage growth starting in 2010. The Dutch government is also proposing to introduce a ceiling of €185,000 on annual pensionable salaries. Although the rationale behind many of these limits is easy to defend, it means that executives are looking less and less to the company's pension plan for their retirement income.

Risk sharing is also restricted in some countries by regulations or tax requirements affecting the extent to which employees can contribute to an occupational pension plan. For example, in the United States, employee contributions to DB plans and conventional DC plans are not tax-deductible, while those to special forms of DC plans (such as 401(k)'s) are. Other countries where almost all DB plans are non-contributory include Portugal and Sweden. In almost all other countries, where DB plans are contributory, employee contribution rates tend to be fixed. This contrasts with the situation in countries such as Denmark and Iceland with collective DC plans, where employee contribution rates may also be adjusted. Another exception is the Netherlands, where employee contributions are often variable and where many conventional DB pension plans raised employee contribution rates after 2000, while a few have been converted into a Dutch variation of collective DC plans.

Pension regulations also determine other specific aspects of the design of DB plans. Table 2 below presents in a highly simplified form the main regulations that affect benefit design of DB plans in selected OECD countries. The regulations are the following:

- *Vesting*: time period after which terminating employees are entitled to the benefit of the employer financed portion of their accrued benefits.

- *Benefit*: the form of the benefit paid at retirement; usually a life annuity, lump-sum, instalment payout or capital drawdown, or a combination thereof.

- *Revaluation*: how deferred benefits of departing employees (early leavers) are revalued during the period until commencement to compensate for inflation.

- *Indexation*: how benefits in payment are indexed over time to compensate for inflation.

Table 2. Main DB benefit design regulations in selected OECD countries

	Vesting[1]	Benefit[2]	Revaluation[3]	Indexation[4]
Austria	Max. 5 yrs	Annuities	Not required	Not required
Belgium	Max 1 yr	Flexible	Not required	Not required
Canada	Max 2 yrs	Annuities	Not required	Not required
Denmark	Max. 5 yrs	Flexible	Not required	Not required
Finland	Immediate	Annuities	n.a.	CPI-wages (80%-20%)
Germany	Max. 5 yrs	Flexible	Not required	Inflation (for details see Annex II)
Ireland	Max. 2 yrs	Annuities	CPI 4% cap	Not required
Japan	20 years for annuities; 3 years for lump sums	Flexible	Not required	Not required
Netherlands	Max. 1 yr	Annuities	Not required	Not required
Norway	Max. 1 yr	Annuities	If allowed by fund's solvency	If allowed by fund's solvency
Portugal	None	Annuity (2/3)	Not required	Not required
Spain	Immediate	Flexible	Not required	Not required
Sweden	Immediate	Flexible	Not required	Not required
Switzerland	Immediate	Annuities	n.a.	Not required
United Kingdom	Max. 2 yrs	Annuity (2/3)	RPI 5% cap	RPI 2.5% cap
United States	Max. 5 yrs	Flexible	Not required	Not required

Source: OECD

Notes: (1) All countries require immediate vesting of employee contributions. The table addresses vesting of employer contributions. In the United Kingdom, employees must be allowed a transfer value that includes employer contributions as an option after 3 months membership. (2) In Germany, for *Pensionsfonds*, only a maximum of 30% of the capital paid at retirement can be paid out as a lump-sum. (3) In Finland (statutory system) and Switzerland, there is full portability of occupational pension benefits. Deferred pension benefits do not exist. In Switzerland, employees have a right to transfer their accrued benefits to their next employer. Otherwise, funds need to be directed to an insurer or banking foundation that provides pension annuities. There is also an auxiliary fund for all remaining cases. In the Netherlands and Sweden there is full portability within industry plans, which cover the majority of workers. While indexation is not mandatory in the Netherlands, once awarded to pensions-in-payment it must be applied equally to deferred vested benefits of early leavers. (4) In Japan, under contracted-out DB plans, indexation is paid directly by the government. There are no indexation requirements for all other plans.

There are three striking differences in regulations between these countries. First, only one country, Portugal, does not have explicit vesting rules. The lack of vesting rules means that accrued benefits can be cut. Indeed, in Portugal employers can curtail or altogether withdraw benefits from employees who leave before retirement.

In all other countries, accrued benefits are protected by law. However, legislation in some countries makes exceptions. In Japan, the practice of benefit reduction was legalised in 1997, provided that certain conditions were met, including the explicit agreement between labour and management and the existence of business difficulties. For Employee Pension Funds (EPFs), the regulation also requires that benefits other than the substituting portion (which substitutes part of the state-run old-age social security earnings-related pension benefit) to be no less than 10% of the substituting portion. Since then the number of pension funds that have taken up this option has increased rapidly (see Box 1).

In Ireland, the supervisor (Pensions Board) may direct trustees to reduce accrued benefits if no adequate actuarial certificate can be presented. In the Netherlands, in case of underfunding, a pension fund could in principle decide to cut accrued (and vested) benefits, but this decision requires the approval of employers, employees and the supervisor, and is only used a measure of last resort. In the United States while "anti-cutback" rules generally prohibit the reduction of vested benefits, trustees of Multi-Employer plans can cut benefits of workers (active and terminated) if the plan is weak. The trustees can eliminate lump sums, other payment options (except the life annuity to single employees and the joint & survivor annuity to married ones), other benefits/rights/features not a part of the accrued benefit (e.g., death benefits after retirement and disability benefits), early retirement subsidies and supplements, and benefit improvements in the past 5 years (which can mean some of the accrued benefit can be cut). Once the plan is healthy again, the trustees do not have to bring those benefits back.

Box 1. Benefit cuts in Japan

Japanese employers have been able to reduce accrued benefits since April 1997. While there are no official statistics, a private firm, Rating and Investment Inc., conducts an annual survey on benefit cuts. The table below reproduces some figures from this survey, showing an increase in the number of Employee Pension Funds (EPFs) that cut benefits in different years. The last column of the table below shows the number of EPFs that cut benefits in payment. This was clearly a much rarer event than cutting accrued benefits. It should be noted that the benefits cut affected those provided on a voluntary basis by EPFs on top of the substituting portion. There were also some cases where the same EPFs cut their benefits more than once. In these instances, each benefit cut was counted.

FY (April-March)	number of EPFs that cut benefits (a)	number of EPFs that cut benefits of beneficiaries (out of (a))
1997	7	0
1998	16	1
1999	52	1
2000	177	3
2001	131	2
2002	99	3
2003	219	15
2004	158	19
2005	111	17

To understand how widespread the practice is, the table below shows the percentage of EPFs that cut benefits each year, together with the total number of EPFs. Given the double counting in EPFs, these figures should be interpreted as a maximum estimate of the proportion of EPFs cutting benefits. It is also noteworthy that after 2000 the number of EPFs decreased dramatically. The main reason for this is the 2001 reform (effective in 2003) which allowed EPFs to return their substituting portion to the government.

at the end of FY	number of EPFs	percentage of benefit cut cases (%)
1997	1,874	0.4
1998	1,858	0.9
1999	1,835	2.8
2000	1,801	9.8
2001	1,737	7.5
2002	1,656	6.0
2003	1,357	16.1
2004	838	18.9
2005	651	17.1

Note: This box was prepared by Junichi Sakamoto, Nomura Research Institute

The second striking fact about Table 2 is that only four countries (Finland, Germany, Ireland, and the United Kingdom) require some form of revaluation or indexation while only in one country (the United Kingdom) are both revaluation and indexation mandatory. In the case of Finland, this regulation only applies to the statutory pension entities that operate under the social security system. This system has mixed financing, partly funded and partly PAYG. The state is therefore effectively guaranteeing the indexation requirements. In Germany, pension plans financed through one the two insurance vehicles, direct insurance and *Pensionskassen*, do not need to index pensions if surpluses are used to increase

benefits. For other financing vehicles, there are different methods of indexation, such as adjustments in line with the lower of price and wage inflation every three years (except when the sponsor is in financial difficulties) or a minimum annual 1% increase.

In other countries, like Portugal and Spain, indexation is common practice when part of collectively bargained agreements, but it is not required by legislation. Pension funds in some countries like Denmark, Norway, Netherlands, Sweden and Switzerland have explicitly tied up indexation to the pension fund's solvency position (conditional indexation).

Probably one important reason why most countries do not require revaluation or indexation of occupational pensions is the fact that social security systems already provide inflation-indexed benefits. By the same token, mandatory indexation in countries like Germany, Ireland and the United Kingdom may be explained by the relatively low levels of public pension benefits in these countries. In the United Kingdom, occupational pension plans can even be a substitute for social security benefits, which may explain the statutory nature of both revaluation and indexation. However, obliging revaluation and indexation increases the cost of pension provision for sponsors. It may not be conducive either to higher levels of benefit security if it leads sponsors to abandon DB plans and establish pure DC plans instead.

Regulations also affect the type of benefit that plans can offer. In half of the countries in Table 1, benefits can only be paid in the form of annuities, except for very small benefits, which may be paid as lump-sums.[8] Of the rest, two impose limits on the portion of the benefit that may be paid in lump-sum form (Portugal and United Kingdom). The rest do not impose any regulations. Hence, for example, in Japan, DB benefits are usually paid as lump-sums. In Belgium in 2006, 72% of total benefits were paid as lump-sums. The same year in Spain, 78% of total benefits were paid as lump-sums.

The indirect impact of regulations on plan design

There are other regulations that may affect plan design indirectly by changing the cost of provision of defined benefit relative to defined contribution plans. Funding regulations come to mind, though the administrative burden of regulatory compliance in general can also vary between DB and DC arrangements.[9] In addition, sponsoring employers are nowadays required to report DB pensions on their accounts at market values which may lead to undesirable volatility in their balance sheets. A less advantageous tax treatment of pensions can also render DB plans less attractive for employers. While employers may scale back benefits in line with the reduced tax advantages, this may not be feasible, leading to a preference to DC arrangements with contributions set at a lower level than in DB plans.

In theory, all the many risks associated with a traditional defined benefit pension plan (investment, longevity, wage and price inflation, etc) are borne by the plan sponsor, with the counterbalancing opportunity that favourable experience under the plan will allow a reduction in its ongoing contributions and, in extremely favourable times, to withdraw a part of the funding excess.

In most countries, this balanced equation has collapsed. Employers cannot recover the surplus accumulated in pension plans or are subject to a substantial excise tax. While they may take contribution holidays, sometimes they are also required to grant additional benefits. This creates an asymmetrical situation whereby employers bear downside risk but have no or little upside potential. As shown in Table 3, only two countries, Ireland and the Netherlands leave the treatment of surplus to the plan rules, while Portugal allows withdrawals as long as the surplus has lasted five years at a specific level above the

[8] For example, in Austria, a lump-sum benefit may be paid if the accumulated balance is less than €9,300.

[9] For example, Keating and Slater (2008) argue that the administrative cost of DB pension funds in the United Kingdom has nearly doubled over the last fifteen years.

accrued liabilities. As it happens, the Netherlands and Portugal are among the few in the OECD where most traditional DB plans (final salary or career average) are still open to new entrants to the labour force.

The reversion of surplus to employers is one of the key issues being debated in the United Kingdom as part of a "deregulation" review. Currently, the law requires that trustees are satisfied that any surplus return is in the members' interests before giving their agreement. In their July 2007 report to the UK's Department of Work and Pensions "Deregulatory review of private pensions", Chris Lewin and Ed Sweeny suggest a reform to this rule, allowing the return of surplus to employers once the scheme has reached the scheme specific funding target and the trustees agree at that time that such a payment should be made. Such a reform would allow plan sponsors to get economic value from pension surplus without appreciably threatening benefit security. However, the UK government has stated its disagreement with the removal of the trustees' approval on the grounds that it would jeopardize the current level of protection for plan members (Department of Work and Pensions (2007)). Within EU jurisdictions, granting employers unconditional access to funding excesses may also potentially run into conflict with employment- and wage-related legislations, if such unconditional access puts at risk DB pensions which under EU legislation are treated as deferred wages.

In the United States, the high tax on excess assets in case of plan termination (50%) is regarded as the main reason why employers prefer to convert them into cash balance plans (Coronado and Copeland (2004)). A conversion into defined contribution arrangements would be treated as a termination of the DB plan and hence trigger the 50% tax on excess assets.

Table 3. Surplus regulation of DB plans in selected OECD countries

	Maximum funding limit	**Contribution holidays**	**Surplus withdrawal**
Belgium	Yes	Optional	Not allowed in case of plan termination, some possibilities in other cases
Canada	Yes	Mandatory	Plan rules with consent of the regulator
Ireland	Notification	Optional	Plan rules
Japan	Yes	Mandatory	Not allowed
Netherlands	No	Optional	Plan rules
Portugal	Yes	Optional	If "structural"
Switzerland	Yes	Optional	Not allowed
United Kingdom	No	Optional	Only possible if funding up to buy-out level, trustees to approve if in best interest of beneficiaries
United States	Yes	Optional	Excess assets taxed at 50%

Source: OECD

More generally, regulations and accounting standards can raise the actual and perceived cost and risk of DB plans to employers. Brown and Liu (2001) argue for example that a lighter administrative burden on DB plans, greater freedom on coverage, the equivalent tax treatment between DB and DC plans (including tax-deductible employee contributions), and stronger unions may be factors upholding DB plans in Canada relative to the United States. Ponds and van Riel (2007) argue that the supervisor's response to the fall in the funding ratio after 2000 – calling for additional contributions to ensure full funding and the build-up of buffers - was one of the key drivers of the move from final salary to career average DB plans (with conditional indexation) in the Netherlands. The Dutch government had already been pushing for this type of plan conversion in the 1990s, and falling markets and new funding regulations simply caused this to happen sooner than anticipated. In the United Kingdom, the introduction of the new accounting standard (FRS17) appears to be an important factor behind the mass closures of DB plans (Klumpes and Whittington (2003)).

The growth of hybrid (DB) pension plans in recent years in some OECD countries (but primarily Japan, the United Kingdom and especially the United States) is partly a response to external pressures on these plans that call for a rebalancing of the burden of risk-bearing between employers and employees. Regulations and accounting standards may have contributed to the shift towards hybrid pension arrangements in which there is a more balanced sharing of risks between employers and employees. However, in some cases, and in particular the United Kingdom, employers have overwhelmingly preferred to replace DB plans for new entrants with "pure" DC ones.

The problems of going to this extreme and implementing pure DC plans are now becoming clear. The cracks are beginning to show. As an ever increasing number of employees are retiring under such plans, the consequences of inadequate contributions, poor investment choices by employees, high management costs, and the dramatic and continuing increase in annuity purchase rates on generating inadequate retirement pensions are becoming painfully obvious. This is another reason for a redistribution of risk between plan sponsors and employees in the form of hybrid DB arrangements. Such plans generally offer higher levels of benefit security than pure DC plans while lowering costs to plan sponsors relative to traditional DB arrangements.

However, as regulators shift their attention away from traditional DB plans, some of the developing regulations for DC and hybrid DB plans are clouding the debate. One simple, but potentially negative example has already been mentioned – namely the imposition of a minimum return guarantee (as opposed to a fixed rate as in a cash balance plan). Under such so-called underpin DB plans, plan sponsors have no opportunities for upside gains, as high investment returns are credited in full to the employees, and the plan sponsors still retain all the downside risks. This is not only an aggravation of the asymmetrical risk problem, it also has potentially adverse consequences on pension plan investments and hence ultimately on the level of pension benefits. Either there will be a single "DC" fund invested conservatively to ensure achievement of the minimum interest guarantee or the employees will have freedom of choice of funds, as under a normal DC plan, but with the obvious problems of moral hazard. The employees will invest in very risky investments, in the full knowledge that they will be protected by the underlying, cash balance type guarantee. In practice, as is already being shown, only the single fund approach is practical. The consequences of low, conservative investment returns on eventual pensions is predictable.

Staying within the realm of traditional DB plans, which plan sponsors and regulators are still trying to retain in such countries as Canada and Ireland, situations of asymmetrical risk mean that plan sponsors will try to avoid any form of overfunding. This will be achieved by making lower contributions, quickly correcting even the slightest overfunding (even temporary overfunding that can disappear as quickly as it arose) and by avoiding the establishment of any contingency reserves. This is, first and foremost, a funding problem, but it also has impacts on plan design. Future plan improvements can only be financed though the 'hard' route of explicit additional plan sponsor contributions (whether in lump sums or under

short amortizations), rather than through the 'soft' route of surplus utilization. Thus, it is easy to imagine that plan improvements in the future will be rare, and there is already some, perhaps circumstantial evidence to this effect.

IV. Implications of plan design and risk-sharing for funding regulations

The primary role of funding regulations is to promote a high level of benefit security, and in particular to protect beneficiaries from one risk that they cannot hedge themselves against, namely the risk of default on the pension promises by the sponsoring employer (in DB plans) or the pension fund (in collective DC plans). In Austria, Germany, Luxembourg and Sweden, book reserving is also allowed. As this form of financing by itself exposes workers to the risk of sponsor insolvency, additional forms of protection are required, as recognised in the OECD Guidelines on Funding and Benefit Security in Occupational Pension Plans. In Germany and Sweden, book reserved pension promises must be insured against the risk of sponsor insolvency with a third party. In Austria, at least 50% of the liabilities must be matched with earmarked sponsor assets held in separate accounts.

Key drivers of funding regulations in selected countries

Annex I shows the wide variations that exist in funding regulations across OECD countries. However, two distinct, broad approaches to such regulations can be identified. One group of countries (which includes Belgium, Canada, Finland, Ireland, Japan, Portugal, Spain, Switzerland, United Kingdom and the United States) does not require "full funding" of the liabilities of pension funds at all times nor the build-up of risk buffers of solvency margins above full funding.[10] The minimum funding level is in fact below 100% in some countries like Japan or Switzerland (90%).[11] Moreover, recovery periods vary significantly across countries, with some (like Ireland and the United Kingdom) allowing up to 10 years.[12]

Another group of countries (e.g. Denmark, Germany – *Pensionskassen* -, Iceland, Netherlands, Norway and Sweden) requires the establishment of a solvency margin above the full-funding level and, with the exception of the Netherlands, requires the full-funding of the pension fund's liabilities (or technical provisions, the insurance term for liabilities that is often used in these countries[13]) at all times, with short recovery periods. For example, pension funds in Germany are subject to a ca.4.5% solvency margin. In the Netherlands, there is a 5% solvency margin, but pension funds have up to three years to reach it if they fall below it.

There is one main explanation for this differentiated approach to funding regulations across countries. For the first group of countries, pension funds are entities that are legally different from life insurance

[10] Full funding is measured differently across countries, so it is not possible to compare levels of security of pension promises across countries on the basis of funding levels alone.

[11] No remedial action is required if the funding level is above this level.

[12] In contrast to other OECD countries, the United Kingdom does not have a prescriptive minimum funding requirement, applied equally to all funds. Instead, there is a requirement to establish a fund-specific funding target and an associated recovery plan in case of underfunding. The regulations do not specify the length of the recovery plan either beyond stating that it should be as short as reasonably affordable for the sponsor. In practice, few recovery plans are longer than ten years and The Pensions Regulator has stated that it will give particular attention to plans longer than this. Both Belgium and Portugal require full funding, but like the United Kingdom, allow pension funds to decide on a recovery period which must ultimately be approved by the supervisor.

[13] In the insurance field, technical provisions are the estimated value of claims which have not been settled at the date on which the financial statements are finalised.

companies and are linked to a sponsoring entity that provides capital back-up in the event of underfunding. The plans supported by these pension funds are therefore of the DB kind.

For the second group of countries, on the other hand, pension funds are often special kinds of life insurance undertakings (or are treated as such) that function on a stand-alone basis without ongoing recourse to the plan sponsor for additional funding to cover underfunding emerging from accrued benefits. This is the case even in countries like Germany, where, by law, there is ultimately a sponsor guarantee on all occupational plans (hence making them DB), but where pension insurance companies (*Pensionskassen*) and pension funds (*Pensionsfonds*) underwrite risks of accrued benefits directly. In some of the other countries in this group (Denmark and Iceland), occupational plans are of the collective DC kind. In the Netherlands, pension funds are separate legal entities financially supported by sponsoring employers, which would normally put them in the first group. However, the new Dutch-type collective DC plans do not – at least in theory – have any recourse to the plan sponsor for additional funding

Comparing minimum funding levels under common valuation methods

Because of differences in valuation methodologies, these so-called minimum funding levels and "full-funding" goals are not comparable across countries. Annex I presents the main aspects of the valuation of occupational pension liabilities in selected OECD countries. One major difference in the valuation approach across countries is the discount rate. Some countries use fixed maximum discount rates set by the government or the supervisor, often in relation to government bond yields (e.g. Finland, Germany, Norway, Portugal, Spain and Switzerland). In other countries discount rates are based on current market interest rates (e.g. Canada, Denmark, Japan, Netherlands, Sweden and the United Kingdom). There are also important differences across countries in mortality assumptions, in the treatment of economic factors such as inflation, in the actuarial cost method used and the assumptions to be made over the service and retirement patterns of plan members. Such differences call for caution when comparing funding regulations across countries. A regulatory system that requires high funding levels on the basis of lax valuation methods and assumptions may offer lower levels of benefit security than one with more flexible funding rules but more prudent assumptions.

One way to assess the required minimum funding level in a common way is to state it as a percentage of the IAS19 measure, the international accounting standard for occupational pension liabilities. Depending on market conditions and the assumptions used, the regulatory measure of liabilities for DB plans may be above or below the IAS19 value. Despite the generally more prudent actuarial assumptions used by regulators, the inclusion of salary projections under accounting standards (using the so-called projected unit credit method) can lead to a higher measure of liabilities for final pay DB plans than the one calculated by regulators. The gap between the regulatory and the accounting measure varies over time and across countries. For example, in Finland, regulatory liabilities are currently between 96-99% of the accounting liabilities. On the other hand, in the United Kingdom, the s179[14] liability measure monitored by The Pensions Regulator was about 83% of the accounting measure (FRS17 or IAS19) as of March 2007 (The Pensions Regulator – Pension Protection Fund (2007)), while the value of technical provisions calculated by the average pension fund was about 96% of the accounting measure (The Pensions Regulator (2007).

[14] The s179 measure estimates the level of benefits guaranteed by the Pension Protection Fund. The Pensions Regulator has established a funding "trigger" somewhere between the FRS17 and the s179 level that varies across pension funds depending on the maturity of the scheme, the strength of the employer covenant and other factors. Pension funds whose funding levels drop below this trigger value are closely monitored by The Pensions Regulator which may intervene only when funding is below a critical level.

A recent report by the Committee of European Insurance and Private Pensions Supervisors (CEIOPS (2008)) also provides an estimate of the level of technical provisions of defined benefit pension plans under different regulatory frameworks. In countries like Spain and the United Kingdom, the technical provisions corresponding to the same pension benefit would be valued at a level 50 percent higher than that in countries like Belgium, Denmark or the Netherlands. A large part of the difference is caused by the presence of mandatory revaluation and indexation requirements.

Risk-based funding regulations

Despite the important differences in funding regulations that still exist across OECD countries, there is a trend towards market-based valuation methods and greater recognition of the risks that pension beneficiaries are exposed to.[15] Policymakers are also giving consideration to the implementation of a risk-based approach to funding regulations in the pensions industry. These new regulations are part of a trend towards risk-based supervision which follows its development in the banking and insurance sectors (Brunner et al. (2008)). Under a risk-based approach, funding requirements should reflect as best as possible the risks borne by pension funds or/and different stakeholders including risk factors related to the nature of the benefit promise and the extent of risk sharing imbedded in DB, hybrid and collective DC plans. Such factors include the following:

- *Types of risks*: pension funds manage two main types of risks, market risks and biometric risks. Under a risk-based approach, the types of risks guaranteed in a particular plan affect the funding requirement. For example, cash balance plans, which do not offer any pre-retirement longevity risk protection or guaranteed annuity conversion rate at retirement, call for funding rules that focus specifically on the investment risk borne by the plan sponsor. On the other hand, DB plans and collective DC plans that guarantee a minimum annuity benefit on entry require funding regulations that also address the uncertainty over longevity projections. In addition to market risks and biometric risks, policymakers using a risk-based approach would also normally require pension funds to make sufficient provisions for operational risks.

- *Flexibility and conditionality of the benefit promise*: funding regulations may also need to consider the extent to which accrued benefits can be adjusted discretionarily or in line with the pension fund's financial performance. For example, in many countries benefit indexation is discretionary while in some even nominal benefits can be cut as a last recourse measure.

- *Contribution policy*: funding requirements may also take into account the extent to which contributions by sponsoring employers and - as is the case in some countries – those by members can be increased to cover any underfunding of accrued benefits. These additional contributions are effectively a contingent capital reserve for pension funds that they can tap into whenever they enter financial difficulties.

The flexibility of benefit promises and contributions are the main policy levers of pension funds in many OECD countries, differentiating them from financial institutions such as banks or insurance companies. This flexibility or risk sharing inherent to occupational pension funds in these countries is also related to their overall governance which often involves employee representation. Such representation ensures an additional level of oversight relative to standard financial products.

As yet, no OECD country has attempted to introduce a comprehensive risk-based approach to funding regulations of the kind that, for example, has been proposed for the insurance industry in the European Union (Solvency II). However, it is expected that some European countries will apply Solvency II to

[15] On the move to market-based valuation methods see Yermo (2007).

pension funds based in their countries as they are regulated as life insurance undertakings. Moreover, some countries have already begun to consider market risk factors in their calculations of funding requirements or as part of their monitoring of solvency levels of pension funds (e.g. stress tests). Under such approach, a riskier investment strategy, with a higher equity allocation, would call for a higher average funding level in order to protect against the potentially larger funding gaps that can emerge. Risk mitigation factors would also need to be considered. Risk-based funding requirements would need to take into account the extent to which such hedging strategies are in place via the use of derivative products, for instance. Policymakers, however, may be reticent to consider investment policies when setting funding rules because it may interfere with the paramount importance of prudence in pension plan investments, leading potentially to short-termist and procyclical investment strategies.

In the OECD, only a few countries (Denmark, the Netherlands, and Sweden) have introduced funding regulations that directly take into account the riskiness of the pension entity's investment portfolio. In Denmark, the quantitative solvency rule is a fixed percentage of the technical provisions (4% plus 0.3% of risk-bearing investments), but a stress test is also carried out. Under the so-called traffic light stress test the supervisor models the different market and biometric risks to which a pension fund is exposed in order to form an opinion about the likely evolution of solvency of the pension fund in the year ahead. The test defines three scenarios, green, yellow, and red, which are characterised by increasingly adverse market and biometric (longevity) shocks. Pension funds under a red light scenario face a severe insolvency risk that requires immediate remedial action. If the pension fund's capital is less than one third of the minimum solvency requirement, the recovery period is usually stated in months and will not normally exceed one year.

The approach taken in the Netherlands is an application of Value-at-Risk, where market downside scenarios of a given probability are used to calculate a buffer or capital requirement for the pension entity. The Dutch FTK risk-based solvency test requires pension funds to build up buffers - above 100% funding of the nominal pension liability – so that there is a probability of at least 97.5% that within a year the funding level will not be below 100%. This solvency test leads to a funding target for the typical fund of 130% of its liabilities. Pension funds have 15 years to make up any difference between their actual funding ratio and the one required by the solvency test. In addition, pension funds must ensure that their minimum funding is above 105% of their liabilities at all times (a 5% solvency margin), and eliminate any gaps within three years.

The general risk-based approach taken by the Dutch FTK has the same one year horizon that is used by the Solvency II approach to measure the capital (or solvency buffer) required to withstand shocks up with a certain confidence (probability) level. There are, however, three major differences between the FTK and the Solvency II framework.

Firstly, while the FTK uses a level of security of 97.5% for pension funds, Solvency II provides a higher level of security, at the 99.5% level, which naturally leads to higher solvency requirements.[16] Secondly, the Dutch minimum funding rules (specifically the 105% solvency requirement) only apply to the nominal liabilities when indexation is conditional. Since most pension funds apply conditional indexation to both accrued benefits and pensions in payment, the solvency requirement is based on about one half of the total liabilities of a typical pension fund. Under the Solvency II framework for insurers, in contrast, a complete and market consistent valuation of technical liabilities takes place, including any option-like commitments. Such conditional liabilities would be included in the measures of technical provisions, which would correspondingly raise the funding requirements on pension funds. Thirdly, Solvency II requires the full-funding of technical provisions at all times, while the Dutch funding rules

[16] The proposed FTK regime for insurance companies also specified a 99.5% confidence level but it has been postponed.

provide a recovery period of three years to meet the solvency requirement and a longer period of fifteen years to meet the buffer requirement.

The differences between the Dutch approach to solvency and Solvency II may be explained by the other two risk factors mentioned earlier, namely the conditionality of benefit promises and the possibility of raising contributions from sponsoring employers and - in some countries - employees in situations of underfunding. Other specific aspects of pension funds that may affect regulations are the fact that they often have a quasi-mandatory membership, stemming from the labour contract and their not-for-profit nature. In the Netherlands, for example, most occupational pension plans are based on the concept of intergenerational risk sharing, which is also a characteristic of pay-as-you-go pension systems. Decisions about the division of costs and benefits are made by social partners reflecting the solidarity and collectivity of these arrangements.

In countries where benefits can be adjusted and where employers' or/and employees' contribution rates can be raised to cover funding gaps, underfunding poses a lower risk for benefit security than in countries where pension funds are stand-alone entities with no link to plan sponsors, and specifically without any recourse to higher contributions from sponsoring employers or plan members in case of underfunding. Under risk-based funding regulations, therefore, such differences would be reflected in funding requirements. A priori, funding needs for DB pension funds of the first kind are lower than for stand-alone pension funds, such as those that operate on a collective DC basis. However, the strength of the employer's covenant varies depending on its creditworthiness, which can be subject to unexpected swings. Given the difficulties involved in assessing and closely monitoring an employer's covenant, it may be complicated to adjust funding requirements on the basis of the financial strength of the sponsoring employer. One country that has partly done so is the United Kingdom, where pension fund trustees are expected to assess the sponsor's covenant when establishing their funding objective. The Pension Regulators funding triggers also take the sponsor covenant into account when determining possible interventions.

From the perspective of benefit security, the presence of arrangements such as the Pension Benefit Guarantee Corporation in the United States or the Pension Protection Fund in the United Kingdom, by protecting DB pension funds against the risk of sponsor bankruptcy, should also be considered under a risk-based approach to funding regulations. Such arrangements may reduce the need for a differentiated approach to funding across companies on the basis of the strength of the sponsor covenant, as insurance premia (or levies) can be set as to reflect the risk of employer insolvency. On the other hand, policymakers are aware of the difficulty of managing these insurance arrangements in a way that accurately reflects the risks insured and may therefore look to protect them from large claims. This is the approach taken by The Pensions Regulator in the United Kingdom, which in addition to regulating and supervising pension funds has as one of its stated objectives the mitigation of risks shifted to the PPF. The PPF itself charges levies that are to a large extent risk-based.

Given the wide range of occupational plan designs and security mechanisms across OECD countries, the same risk-based funding regulations could lead to rather different funding outcomes.[17] While the implementation of a prescriptive risk-based funding requirement is open to debate[18], it is clear that any country considering such exercise should carefully consider the specificities of pension funds and in particular the nature of risks being guaranteed and their distribution among different stakeholders.

[17] For a recent empirical analysis of risk-based funding regulations for pension funds using Solvency II rules see Peek et al. (2008).

[18] For a recent discussion of this approach see e.g. Bjerre-Nielsen (2007).

V. Concluding remarks

Occupational defined benefit pension plans are facing an increasingly stricter regulatory environment in many OECD countries. At the same time, new accounting standards have been introduced that have enhanced the perceived cost and risk of these plans to employers. In some countries employers and employee representatives have successfully redesigned benefit promises, introducing risk sharing elements that will make them more sustainable in the future. In other countries, on the other hand, the new pension plans being created are of the pure defined contribution kind, with correspondingly higher uncertainty over benefit levels.

Regulations should have as their main aim the provision of high levels of benefit security at an acceptable cost to members, sponsoring employers and other stakeholders. Hence, to the extent that regulations drive plan sponsors away from traditional DB and even hybrid DB plans and towards pure DC plans, the soundness of these regulations may be put into question. Regulations which are intended to protect beneficiaries may have had the unintended consequence of raising the cost of DB provision beyond a level at which they have a value to plan sponsors. Two kinds of regulations may be considered: those that set constraints on plan rules and those that aim at ensuring that benefit promises are honoured.

Plan design regulations, such as minimum return or benefit requirements, indexation and revaluation rules have raised controversy when they are applied to what are otherwise voluntary pension arrangements. Such rules, although they may be justified from social policy objectives, reduce the attractiveness of DB plans for sponsoring employers. For example, mandatory indexation requirements can restrict the development of hybrid arrangements such as cash balance and conditional indexation plans which have been heralded in some countries as a viable solution to the increasing cost imposed by traditional defined benefit arrangements. From the perspective of plan members, such hybrid plans are a priori superior to "pure" DC arrangements as they reduce the uncertainty over benefit levels inherent to the latter. On the other hand, statutory indexation requirements may be justified in countries where private pension plans play a central role in retirement provision.

Strict funding requirements and the withdrawal of the right to excess assets (or surplus) have also raised the financing costs to employers and greatly reduced the upside potential. While this regulatory tightening may be justified in the interest of benefit security it may contribute to the abandonment of DB provision, even in hybrid forms, leading to what are ultimately highly uncertain pure DC pensions. A better alternative to pure DC could be the detachment of DB pension funds from sponsoring employers into stand-alone pension entities offering guaranteed benefits, as has taken place in some Scandinavian countries such as Denmark and Iceland. In the Netherlands, collective DC plans, where employers commit to a fixed contribution rate are also gaining ground.

The trade-off between benefit security and cost is one that requires careful analysis and is obviously being resolved in different ways across countries. It is not possible to define an ideal model of funding regulations or member protection requirements. However, policymakers should at least consider the impact of regulations on sponsors' willingness and ability to support different kinds of pension arrangements.

The trend towards risk-based regulation observed in some OECD countries may help better address the balance between benefit security and cost. Under a risk-based approach, funding regulations should take into account the nature of benefit promises, and in particular the specific risks being guaranteed, and the way those are shared between the different stakeholders. While the document does not enter the debate over the application of risk-based quantitative funding requirements to pension funds (as under Basel II or Solvency II) – specially as cross-border issues are not addressed here -, it identifies the risk factors that should be evaluated and considered in a comprehensive risk-based regulatory approach, whether prescriptive or principles-based. The three main risk factors identified are the nature of risks and the

guarantees offered under different plans designs (with risks falling under three main groups - market, biometric, and operational risks), the extent to which benefits are conditional or can be reduced under certain circumstances, and the extent to which contributions may be raised to cover any funding gap. In addition, the strength of the guarantee or covenant from the sponsoring employer(s) and of insolvency guarantee arrangements should be carefully assessed when designing funding requirements.

The flexibility of benefit promises and contributions are the main policy levers of pension funds in some countries and differentiates them from financial institutions such as banks or insurance companies. This flexibility or risk sharing is also related to the overall governance of pension funds in these countries which often involves employee representation, ensuring an additional level of oversight that does not exist in standard financial products. In some countries, like the Netherlands, which are clinging to DB provision (though in a hybrid form) decisions about the division of costs and benefits of pension plans are made by social partners reflecting the solidarity and collectivity of these arrangements.

All these considerations call for risk-based funding regulations to be set in a way that reflects the risks to the members' benefits taking into account the flexibility of the benefit promise and contribution policy, including the ability to raise contributions when a funding deficit emerges. Future work could focus on the specific design of funding rules, as part of a broader project on regulatory efficiency and effectiveness.

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ANNEX I: OECD PENSION FUND REGULATIONS ON CALCULATION OF LIABILITIES

	Accrued liabilities / Technical Provisions	Employee turnover	Early retirement	Discount rate and other economic assumptions	Mortality Tables	Expenses for winding up	Minimum funding	Maximum amortisation period
Belgium	The calculation of technical provisions must be prudent and take into account the risk profile of the pension fund (IORP). Furthermore, the technical provisions must at least equal the vested reserves, which are determined by the pension plan rules and the Social and Labour law. When Belgian social legislation is applicable the technical provisions must at least be the maximum of vested rights as defined in the plan rules and own contributions accumulated with an interest rate of 3.75%. Minimum vested rights are calculated on the basis of current salaries with an interest rate of 6% and specific mortality tables (MR 88-90 table for males and the FR 88-90 table for females).	None	Most advantageous	Belgian prudential legislation: the discount rate for the calculation of the technical provisions has to be chosen in a prudent manner and taking into account: (i) the return on covering assets as well as future returns and/or (ii) the return on bonds of a Member State or on other high-quality bonds.			100% of technical provisions	Not specified. In case of underfunding, a recovery plan which takes into account the risk profile of the pension fund (IORP) must be submitted to and approved by the regulator (CBFA). It is up to the pension fund to decide itself on the most appropriate recovery plan, but it has to be approved by the CBFA

Canada	Plan termination liability (current unit credit)		Most advantageous	interest rate of x% per annum for 10 years and y% per annum thereafter. The rate "x" is equal to the market yield on 7-year Government of Canada benchmark bonds plus 0.5%. The rate "y" is a more complicated blend of market yields on such 7-year bonds and on long term Government of Canada benchmark bonds, again plus 0.5%. Lower interest rates apply when the plan provides indexation of pensions; the formulas are specified in the CIA Standard of Practice.	UP-94		Two tests must be met. (i) 100% of technical provisions. (ii) 100% funding of going concern liabilities under the selected actuarial costing method (e.g. PBO under projected unit credit method).	5 years.
Finland	Accrued benefits calculated under current unit credit method			3.5%-3.8% depending on the plan			100% of technical provisions, no solvency margin	Immediate action, but period not specified.
Germany	The technical provisions are the present value of the future liabilities minus the present value of the future premiums. The valuation of liabilities includes salary increases or inflation revaluation between the valuation date and retirement age if these are included in the pension promise.	None		The maximum discount rate for *Pensionskassen* and *Pensionsfonds* (if the latter offer insurance-like guarantees) is currently 2.25% for new schemes. *Pensionsfonds* can use market interest rates on a best estimate basis if they offer no insurance-like guarantees.			100% of technical provisions, solvency requirement of about 5% of technical provisions.	*Pensionskassen*: underfunding has to be eliminated immediately. *Pensionsfond*s: maximum underfunding of 5% of technical provisions for a maximum of 3 years (certain conditions have to be met). In case of contribution payment during the period of holding a pension a maximum of 10% of technical provisions. The recovery period can be extended up to 10 years by the supervisor (certain conditions have to be met).
Ireland	Plan termination liability (current unit credit), including mandatory revaluation of benefits with 4% cap, until retirement	None	Most advantageous	(a) a pre-retirement discount rate of 7.25%; (b) a long term post-retirement discount rate of 4.50%; (c) a pre-retirement price inflation rate of 2.25%; and (d) a post-retirement long term rate of price inflation of	90% of PMA92 for males and 90% of PFA92 for females.	Yes, deducted from scheme's assets for the purpose of funding regulations	100% of technical provisions, no solvency margin	3 years, but can be extended up to 10 by the regulator if certain conditions are met.

				2.00%.				
Japan	Plan termination liability (current unit credit)			80-120% of 10-year government bonds issued during the previous 5 years.			100% funding of contracted-out portion, 5% solvency margin; 90% funding for total plan benefits.	7 years, but was temporarily extended to ten years.
Netherlands	Accrued benefits calculated under current unit credit method	None		swap rate	GBMV 1995-2000 table plus allowance for future mortality improvement.	Yes	100% of technical provisions, solvency margin of 5%, risk-based reserve, fund-dependent, averaging about 30% of accrued liabilities inclusive of 5%.	3 years for solvency margin, 15 years for buffer.
Norway	Accrued benefits calculated under current unit credit method			4% discount rate until 1993. For contributions due after 1 January 2004 and pension funds established after 1993 the maximum rate is 3%, 2.75% for new contracts after 2006.			100% of technical provisions, solvency margin of 8% of the total risk-weighted asset items and off-balance sheet items.	Immediate action, but period not specified.
Portugal	Accrued benefits calculated under current unit credit method. If indexing of pensions is contractually guaranteed, then an allowance for the effect of future indexing must be included in the calculation of the accrued liabilities.	None		4.50%	TC 73/77 mortality table must be used.		100% of technical provisions, no solvency margin	Not specified. A plan to eliminate any underfunding must be submitted to the regulator. The effect of changes in regulation can be amortised over 20 years.
Spain	Projected Benefit Obligation (including salaries at retirement - projected unit credit method)		Most advantageous	4% discount rate. Inflation assumption of 1.5-2.0%.	PERM/F-2000. For new plans, GRM/F-95 tables can be used.		100% of technical provisions, 4% solvency margin	Up to 5 years (extendable to 10 by the supervisor).
Switzerland	Accrued benefits calculated under current unit credit method						90% funding of technical provisions. Fluctuation	Less than 10 years. Normally, 5-7 years

				reserves are actively encouraged.	
United States	Accrued benefits calculated under current unit credit method	Simplified yield curve based on a two-year average of high-grade corporate bonds of appropriate duration.	RP-2000 Mortality Tables plus an allowance for future mortality improvements.	100% of technical provisions, no solvency margin	7 years.

Source: OECD and Pugh (2007)

ANNEX II: RISK SHARING FEATURES OF DB AND COLLECTIVE DC PLANS IN SELECTED COUNTRIES

AUSTRIA

Pension plan and fund types

Most occupational pension plans in Austria are of the traditional final-average earnings DB type and must be administered by *Pensionskassen*, book reserved or insured. DC plans also exist and are becoming more important, because allocated funding is required under any *Pensionskasse*.

Pensionskassen are the only type of pension fund in the country and are by law distinct from life insurance undertakings. Pensionskassen are regulated by the 1990 *Pensionskassen* Act. Employers and employees are the only shareholders of a *Pensionskasse* covering a single employer. For other *Pensionskassen* there are no specific provisions as to shareholding, but those open to any employer are usually owned by the financial institution that establish them while those set up along industry lines are owned jointly by employers and employees.

Benefits and contributions

By law, *Pensionskassen* must include at least old-age and survivors' benefits and may additionally include disability benefits. For tax purposes, the maximum replacement rate may be 80% of final earnings, or 100% including the public pension. Benefits must be paid in the form of annuities until death. Lump sums are only allowed for small amounts and special cases. Until 2005, *Pensionskassen* were required to offer a minimum yield on accounts and a specific annuity conversion rate for transforming the accumulated balance at retirement into an annuity. After 2005, the minimum return was made optional.

There is no requirement for indexation of benefits.

By law, there is a maximum vesting period of 5 years. The law also sets out the way of calculating the benefits that must be paid in case of departure from the company before retirement.

In case of plan termination by a financially viable employer, all accounts and corresponding assets must be transferred to another Pensionskasse or a life insurance company, unless the plan contract stipulates that the beneficiaries should stay in the existing Pensionskasse.

Contributions into pension plans and other plan conditions are decided as part of a collective bargaining agreement. Most plans have contributions from both employers and employees.

The collective bargaining agreement that sets out the plan's terms must specifically determine whether there is an obligation on the sponsoring employer(s) to pay additional contribution in case of underfunding. Most plans have such a clause (making them DB from a company accounting perspective).

BELGIUM

Pension plan and fund types

Since the implementation of the Vandenbroucke Law in January 2004, employers sponsoring DC plans are required to guarantee a minimum rate of return on their contributions (3.25 percent nominal) and a minimum rate of return on employees' contributions (3.75 percent). Hence, there are only conventional DB plans and floor or underpin (hybrid) plans, where employees get the higher of a benefit calculated on the basis of the minimum guarantee return and the benefit calculated with the market value of the portfolio at retirement.

There is only one type of pension fund in the country and are by law distinct from life insurance undertakings. Pension funds must take the legal form of an organisation for financing pensions (OFP), where employers are members and participants are beneficiaries. Old forms of pension funds, such as foundations and mutual associations are allowed until the end of 2011.

Benefits and contributions

There is no requirement to pay DB or hybrid benefits in the form of annuities. Most plans provide the option of either a life annuity or a lump sum payment, but the majority of retiring employees elect lump-sums.

There are no benefit indexation requirements.

Employee contributions must vest immediately, while employer contributions must vest within a year.

In case of plan termination by a healthy sponsor, the entire assets are allocated between the plan members or are allocated in an institution (e.g. foundation) with a social purpose.

Contributions into pension plans and other plan conditions are decided as part of a collective bargaining agreement. Most plans have contributions from both employers and employees. In the case of underpin plans, employees usually contribute around 35% of the total contribution. In the case of conventional DB plans, employees usually contribute only around 10% of total contributions, primarily because employee contributions on that portion of their earnings below the social security salary ceiling are usually zero or close to zero.

In case of overfunding, the excess assets cannot revert to the employer.

In case of underfunding, a plan to liquidate the shortfall must be submitted to, and approved by, the regulator. However, there is no regulation concerning the split in contributions between employers and employees.

CANADA

Pension plan and fund types

Pension plans can be of any type (DB, hybrid or DC).

Pension funds must be established as trusts in Canada and are by law distinct from life insurance undertakings and regulated differently.

Benefits and contributions

There are no indexation requirements for pension benefits.

Provisions on vesting vary slightly under federal and provincial legislation. Full vesting is, however, generally mandatory after a maximum of 2 years of plan membership or upon plan termination. Main exceptions are the provinces of New Brunswick (5 years of continuous service) and Prince Edward Island (5 years of continuous service and 3 years of plan membership if the plan is terminated prior to normal retirement date). Upon termination of employment before vesting, employees receive a refund of their own contributions. Plan rules may provide for interest to be payable on these contributions. In case of DB/hybrid plan termination by a healthy sponsor, legislation in some provinces requires that any underfunding must be corrected immediately by additional employer contributions and annuities purchased from insurance companies. If the terminated plan is overfunded, surplus funds must be applied to provide extra benefits to members. In some provinces, sponsors may access surplus assets, subject to obtaining the consent of at least two thirds of members, former members and other persons within prescribed categories.

Most DB and hybrid plans are contributory.

In case of overfunding, there is the possibility of paying surplus to the employer if allowed by the plan rules and with the consent of the regulator. The other options are reductions in employer contributions (employee contributions continue) and plan improvements.

In the case of underfunding, it is normally only the plan sponsor that makes additional contributions. The exception is public sector plans, where both the employee and employer contributions fluctuate with the funded status of the plan.

DENMARK

Pension plan and fund types

Most pension plans are collective (protected) DC, but some large employers have kept DB plans.

Most workers are covered by collective DC plans administered by pension insurance companies set up at the industry or occupational level. They are mutually owned by pension plan members and are regulated as life insurance undertakings. Some life insurance companies also offer insured DC plans to employers whose employees are not covered by industry plans.

Pension funds are used only by company DB plans and are by law distinct from life insurance undertakings and are established as foundations. They have a separate regulatory framework (the Company Pension Funds Act), but it is very similar to that of pension insurance companies. There is only a very small number of such plans.

Benefits and contributions

Benefits under collective DC plans are calculated on the basis of a variable interest rate and annuity conversion rates that are set on joining the plan. Only nominal benefits are guaranteed. There are no indexation requirements for pension benefits. Excess returns to investment (above the minimum return) are accumulated in bonus equalisation funds and allocated to the insured over time in the form of annual increases of promises made – increases made on the basis of bonus allowances are guaranteed. The guaranteed interest rate on contributions may be lowered but this only affects new entrants to the plan.

In the case of plans implemented through pension funds, employee contributions vest immediately. Employer contributions vest after a maximum of 5 years, but immediate vesting is common practice. In the case of insured plans, the sponsoring employer may surrender the insurance policy if an employee is younger than age 30 and terminates employment before completing 5 years of plan membership. Other categories of employees have immediately vested rights in the policy.

Collective DC plans are negotiated via industry-wide bargaining agreements so in principle they cannot be terminated. Upon termination of a company DB plan, assets are allocated among members and beneficiaries.

Plans tend to be contributory. Contribution rates for the collective DC plans are fixed and may only change as a result of new collective bargaining settlements between employer and employee associations. Contribution rates tend to be split on a 1:2 ratio between employees and employers. Employer contribution rates in company DB plans vary, while employees' tend to be fixed.

In case of underfunding, the minimum interest rate in collective DC plans can be lowered, but this only affects new entrants to the plan. In company DB plans, if a funding deficit emerges it is the employer's responsibility to increase contributions.

FINLAND (statutory plans)

Pension plan and fund types

The main statutory pension plan in Finland is called the TyEL plan. The TyEL plan is a career-average DB and is a financed by contributions from employers and employees.

The TyEL plan is administered by pension funds and pension insurance companies (many of which are mutually owned by members and are set up along industry lines). About 85% of individuals are in plans managed by pension insurance companies.

Pension funds are by law distinct from life insurance undertakings and are established as foundations. The regulatory framework, however, is very similar to that of pension insurance companies.

Benefits and contributions

Benefits can only be paid as annuities and are calculated on the basis of an accrual rate and contribution period. The yearly pension accrual is 1.5% of pensionable earnings for members aged 18 to 52, 1.9% for members aged 53 to 62 and 4.5% for members aged 63 to 68. The old-age pension must not exceed 60% of pensionable earnings. [Additional benefits can be provided via voluntary, supplementary arrangements by the same institutions that administer the statutory system.]

Indexation is mandatory. Old-age pensions for persons over age 65 are adjusted in line with an index for which changes in the CPI weigh 80% while changes in wages weigh 20%. Pension rights are preserved if members interrupt or terminate participation in the labor market before retirement age. Since January 1, 2005, preserved rights are indexed in line with an index for which changes in the CPI weigh 20% and changes in wages weigh 80%.

There is immediate vesting.

Statutory plans cannot be terminated.

Plans are contributory. Total employer and employee contributions to TyEL in 2008 are approximately 21% of payroll. In 2008, employees under age 53 must contribute 4.1% of earnings and employees at age 53 or older must contribute 5.2% of earnings.

In case of underfunding, employers are required to increase their contributions to the plan.

GERMANY

Pension plan and fund types

Pension plans can only be DB, as any plan must be capital protected at retirement and, by law, employers are ultimately responsible for any pension commitments.

DB plans may be financed via pension funds (*Pensionsfonds*), pension insurance companies (*Pensionskassen*), support funds, book reserves or insurance contracts.

Pensionsfonds are by law distinct from life insurance undertakings and regulated in part differently. They either take the form of joint-stock companies or mutual pension fund associations. *Pensionskassen* are a special kind of life insurance companies and are regulated as such. In general, they take the form of joint-stock companies or mutual insurance associations. Most *Pensionskassen* were traditionally set up by employers (or groups of employers) but some new ones (since the 2001 pension reform law) were set up by life insurance companies, who offer them to any employer. Both *Pensionskassen* and *Pensionsfonds* must have supervisory.

Benefits and contributions

Benefits are largely paid in the form of annuities. Lump sums are possible but subject to a different tax treatment. *Pensionsfonds* do not allow full lump sum payments. For *Pensionskassen* and *Pensionsfonds* that provide insurance-like guarantees, there is an official maximum discount rate that was lowered in recent years to the current level of 2.25% for new schemes. Pensionsfonds can use market interest rates on a best estimate basis if they offer no insurance-like guarantees.

There is no legal requirement to index preserved benefits under a defined benefit scheme. Benefits in payment, on the other hand, must be indexed to inflation. There are different methods of indexation available since the reform of 1999. One method is to make adjustments in line with the lower of price and wage inflation every three years (except when the sponsor is in financial difficulty). Another method is a fixed commitment of a minimum annual 1% increase from the outset. With the two insurance vehicles, direct insurance and *Pensionskassen*, no indexation is needed if (insurance endowment) surpluses are used to increase benefits.

Employee contributions vest immediately. Employer contributions vest if the plan member reaches age 30 and has at least five years of plan membership. Retrospective reductions of benefits are not allowed.

Underfunding is not permitted for *Pensionskassen* under German regulations. *Pensionsfonds* are allowed to be underfunded if the deficit does not exceed 5 % of the amount of technical provisions and the recovery period does not exceed of 3 years and further conditions have to be met. If contribution payments by the employer are also foreseen during the period of holding pensions the deficit may not exceed 10% of the amount of the technical provisions. In this case the recovery period may be extended up to 10 years by the supervisor and further conditions also have to be met. The pension entity (*Pensionskasse*, *Pensionsfond*) underwrites the guarantee in the first place while there is a subsidiary guarantee by the employer. Ultimately, the employee has an enforceable claim against the employer.

ICELAND

Pension plan and fund types

Occupational pension plans are mandatory in Iceland. Private sector workers are covered by collective (protected) DC plans, while public sector workers (and workers of state-owned banks) are covered by DB plans.

All plans must be financed via pension funds, which must also offer disability and survivors' pensions. Pension funds are by law distinct from life insurance undertakings (and regulated differently) and are established as foundations. Collective bargaining at the industry level is common. Hence pension funds are usually tied to a specific collectively bargained scheme. There are a few open pension funds for workers not covered by union agreements.

Benefits and contributions

By law, pension funds must guarantee a minimum replacement rate of 56% of the worker's wage after a 40-year contribution period, but pension funds aim at a replacement rate of 60-70% via a bonus system. A bonus is normally paid into all members' and beneficiaries' accounts whenever funding ratios are above a certain threshold. The bonus only increases accrued benefits and pensions in payment and does not affect future rights. Benefits must be paid in the form of annuities.

Benefits must at least be indexed to the Consumer Price Index (CPI). A small number of pension schemes index pensions to salaries.

Employer and employee contributions vest immediately.

In case of a pension fund being terminated, all assets must be transferred to a different pension fund.

Employee and employer contribution rates are fixed, but can be increased as a result of collective bargaining agreements. Up to 2004, employees were contributing 4% of their salaries, while employers were contributing 6%. As a result of wage settlements in 2004, the employer's mandatory fund contribution increased to 7% in 2005 and 8% in 2007, in order to meet increased costs from disability benefits.

Pension funds react to underfunding caused by negative investment performance by adjusting downwards accrued benefits and pensions in payment, but leaving future benefit accruals unchanged. If the difficulties stem from benefits thought to be too generous given mortality and morbidity rates, the benefit rules for future accruals are changed.

IRELAND

Pension plan and fund types

Pension plans can be of any type (DB, hybrid or DC).

Pension funds must be established as trusts in Ireland and are by law distinct from life insurance undertakings and regulated separately.

Benefits and contributions

Benefits must be paid as annuities though a small part (up to one a half times final annual salary) can be paid as lump-sums.

There are no mandatory indexation requirements for pensions in payment, but deferred benefits must be indexed to the CPI with a cap of 4% p.a.

All employee and employer contributions must be vested within two years of plan membership. If employees terminate their employment before completing the two years of membership, they are entitled to a refund of their own contributions. Plan rules may provide for interest to be payable on these contributions.

In case of DB/hybrid plan termination by a solvent sponsor, there is no debt on the employer. Priorities for allocating the assets are prescribed in detail in the law and override any provisions in the plan document. If the terminated plan is overfunded, surplus funds must be allocated among members in accordance with the priorities prescribed in the Pensions Act, and then in accordance with the plan rules. If there are still excess assets, and if the plan rules so provide, such assets can be refunded to the plan sponsor.

Most DB and hybrid plans in Ireland are contributory, but while employee contributions are a fixed percentage of salary, employer contributions vary depending on the funding level.

In case of underfunding, therefore, it is normally only the plan sponsor that makes additional contributions.

JAPAN

Pension plan and fund types

Until 2001, occupational pension plans in Japan could only be of the DB kind. A reform in 2001 allowed DC plans for the first time. Many final salary DB plans have also been transformed into cash balance plans.

In addition to the DB and DC plans found in other OECD countries, Japanese employers offer severance schemes backed by book reserves, though pension funds are sometimes also used.

There are three types of DB plans: the Employees' Pension Fund (EPF); Tax Qualified Pension Plan (TQPP); and the new Defined Benefit Corporate Pension (DBCP), of both a fund-type and contract-type. Employers are required to wind up TQPPs by 2012.

There three main types of pension funds in the country and are by law distinct from life insurance undertakings and regulated differently. EPFs, TQPPs and the fund-type DBCP are financed via pension funds, established as independent legal entities with legal capacity. Contract-type DBCPs and DC plans, on the other hand, are administered directly by banks and insurance companies without the need to establish legally separated entities. DC plans can also be administered by Employees' Pension Funds and National Pension Funds.

Benefits and contributions

The contracted-out part of EPF benefits must be paid as annuities (the incremented part relating to indexation is paid directly from the government to the beneficiaries), but supplementary benefits and benefits from other plans were typically paid as lump-sums. In DBCPs, this lump sum value has increasingly been converted to an annuity using a specified interest rate, but indexation is not required.

The law require pension funds to provide annuities after 20 years of contributions and lump-sum benefits after 3 years of contributions. Traditionally, benefit rights were not considered to accrue until the employee retired or left their employer. The reduction of benefits accrued from past service was possible, but was only regulated in 1997. Since then, benefit accruals can be cut[19] only if certain conditions are met. In particular, two-thirds of employees must support the proposal and the employer's financial difficulties must make it very difficult for the employer to pay sufficient contributions and maintain the DB plan. Another notable development has occurred in a few cases where pensioners' benefits have been pared down.[20]

The termination of a pension plan entails the distribution of assets among members after the payment of all benefits to current pensioners. If a solvent employer wishes to terminate an underfunded plan, it must first cover the deficit, but benefits can also be reduced if the employer is in financial difficulties (see above).

[19] The most common pattern has been where pension plans reduced the annuity amount, by lowering the assumed rate of interest for the conversion of original lump-sum value into annuities. Of late, this reduction has not been limited to monthly annuity amounts, but rather it has also affected the value of the lump-sum amount.

[20] This reduction is possible provided that two- thirds of pensioners agree, and that pension plans reimburse the present value of benefits in lump sum if any of the pensioners so request.

In the contracted-out portion managed by EPFs, contributions are shared equally between employers and employees. For supplementary EPF benefits as well as those provided via DBCPs, contributions are normally only paid by employers.

In case of overfunding, employer contributions may be reduced or suspended.

In all three types of DB pensions, employers must compensate for underfunding.

NETHERLANDS

Pension plan and fund types

Pension plans can be of any type (DB, hybrid, or DC). In practice, most plans are career-average DB plans, though some have been transformed into collective DC by conservatively fixing employer contributions over long periods (often more than 5 years).

Pension plans may be financed via pension funds or insurance policies.

Pension funds in the Netherlands are usually established as foundations (Stichtings) and are by law distinct from life insurance undertakings and regulated separately, though there are increasing similarities in the regulatory framework governing both types of institutions.

Benefits and contributions

Benefits must be paid in the form of annuities.

Most DB plans offer only protection of nominal benefits, while revaluation of deferred benefits and indexation (of both accrued benefits and pensions in payment) is typically only provided if the funding level is sufficiently high (so-called conditional indexation).

Employer and employee contributions must vest after one year. Some plans provide for immediate vesting. Employees receive a refund of their own contributions if they terminate employment before vesting.

If an overfunded plan is terminated, the entire assets are allocated between the plan members.

Both employers and employees contribute to occupational pension plans.

In case of overfunding (beyond the level required to finance indexed benefits, as defined in the 2006 Pensions Act), contributions may be reduced or suspended or the sponsoring employer may withdraw part of the funding excess. This is, at least in principle, not possible for the collective DC plans that are currently being established by some employers.

In case of underfunding (funding ratio below 105%), conditional indexation will be subject to the provisions in the short term recovery plan. In the case of funding above the 105% threshold but below the provision of full buffers (around 130%), indexation will be subject to the provisions in the long-term recovery plan. Other options in the case of underfunding include increasing contributions (employers and employees will normally share the burden of additional contributions, though the precise split is plan-specific) and reducing future benefits. With the approval of the regulator (the DNB), even accrued benefits can be reduced.

NORWAY

Pension plan and fund types

Pension plans can be either DB or DC. Historically, pension plans in Norway have been DB final pay plans. DC plans were introduced in 2001 and are becoming increasingly popular, although DB plans are still the norm for larger employers. In 2006, Norwegian law mandated occupational pensions be offered for virtually all employees. Almost all pension plans that were implemented due to that 2006 law have been DC in nature.

DB plans must be implemented either through the establishment of a pension fund or through an insurance contract with a life insurance company. Most companies finance their pension plans via insurance contracts.

Pension funds in Norway (Pensjonskasser) are by law distinct from life insurance undertakings, but regulated in the same way. They are subject to a minimum capital requirement separate from funding requirements. Pensjonskasser are normally set up at company level and owned jointly by employers and employees.

Benefits and contributions

Benefits must be paid in the form of annuities. Most DB plans in Norway offer a benefit of 60% - 70% of final pay after 30 years of service, inclusive of social security.

Indexation depends on investment returns. In DB plans, part of the investment returns must be allocated to a fund dedicated to financing increases in pensions in payment.

Employer, and employee contributions if any, must vest after 12 months of plan membership.

If a terminated plan is overfunded, the excess assets are normally used to enhance members' benefits.

Normally, only employers contribute to occupational pension plans. If employees are required to contribute, the rate must not exceed 4% of total salary.

Because DB plans tend to be non-contributory, in case of underfunding, it is normally the full responsibility of the sponsoring employer to cover the deficit via additional contributions.

PORTUGAL

Pension plan and fund types

Occupational pension plans can be of the DB or DC kind. Hybrid arrangements are not common. Pension plans can either be implemented through pension funds or contracts with an insurance company.

There is only one type of pension fund in the country and are by law distinct from life insurance undertakings. Pension funds do not have legal capacity and are administered and represented by life insurance companies or dedicated financial institutions. Pension funds may be closed (limited to single employer, group of employers or employees belonging to a specific union) or open.

Benefits and contributions

Benefits are generally paid as pensions, but, upon request of the retiree and if the plan provides for this option, up to one-third of the capital accumulated, or the benefits accrued, by employer contributions may at retirement be paid as a lump sum. The part of the capital accumulated, or the benefits accrued, by employee contributions under a contributory plan can always be paid as a lump sum. DB plans have usually been integrated with the social security scheme with a total benefit target of about 80% of final salary. More recent defined benefit plans are often nonintegrated and provide benefits of between 10% and 20% of final salary.

Indexation is not mandatory. Increases of pensions in payment are granted on a discretionary basis by the plan sponsor(s) and are usually in line with wage increases.

There are no mandatory vesting rules in Portugal. Employers can curtail or altogether withdraw benefits from employees who leave before retirement. Members of a contributory plan are entitled to a deferred refund of their own contributions that becomes payable at retirement age, but there are no legal requirements for interest to be paid on the contributions.

The allocation of excess assets (after all vested and non-vested accrued benefits have been guaranteed) from a terminated, overfunded pension plan is decided jointly between the pension fund manager and the plan sponsor and requires prior approval by the pension supervisor, ISP. A special tax is applied on assets reverted to the sponsor, unless the sponsor can prove that the excess assets arise from cessation of labour contracts.

Most plans are non-contributory, that is, only the employer contributes.

In case of overfunding, contributions may be reduced or suspended. The sponsoring employer may withdraw part of the funding excess only under specific circumstances (e.g. deemed as structural rather than cyclical) and is subject to approval by the regulator.

As plans are non-contributory, it is normally the sponsoring employer’s responsibility to increase contributions in order to eliminate a situation of underfunding. However, as explained above, benefits can also be cut back

SOUTH AFRICA

Pension plan and fund types

Pension plans can be of any type (DB, hybrid or DC), but most are DC without any return or benefit guarantee.

Pension funds must be set up as trusts and are by law distinct from life insurance undertakings. Pension funds may be fully invested in life insurance policies, in which case they are known as underwritten funds.

Benefits and contributions

Benefits may be paid as lump-sums or annuities.

There is a requirement for indexation of benefits in payment and the revaluation of deferred pension rights, but this is subject to its affordability by the employer.

Benefits vest immediately. Employees leaving their employer are paid their accrued benefits as a lump-sum. There are no preservation requirements or option to maintain deferred benefits with the previous employer.

There are no specific provisions for the funding of a deficit in case of termination of a DB plan.

Most plans are contributory.

Underfunded DB plans are required to submit a recovery plan to the pension fund supervisory authority. However, there is no regulation concerning the split in contributions between employers and employees.

SPAIN

Pension plan and fund types

Plans may be DB, DC or hybrid, but most are DC.

Pension plans may only financed via pension funds or mutual pension insurance companies (*mutualidades de prevision social*).

Benefits and contributions

Benefits may be paid as annuities, lump sums or a combination of both.

There are no indexation requirements for pensions in payment. The pension plan control commission decides on benefit adjustments on a discretionary basis. Deferred pension rights need not have cost-of-living protection but plans negotiated in collectively bargained agreement usually offer some form of revaluation.

Employee and employer contributions vest immediately.

If an overfunded plan is terminated, excess assets are distributed among plan members and beneficiaries in proportion to their vested rights.

Plans tend to be contributory, with equal contributions from employers and employees.

There are no specific rules on addressing a situation of overfunding. The current practice is to reduce the sponsor's contributions or increase benefits.

In case of underfunding, normally employers and employees share responsibility for eliminating the deficit, but there is no statutory maximum period for correcting the shortfall.

SWEDEN

Pension plan and fund types

The occupational pension system in Sweden is overwhelmingly driven by collective agreements, and is effectively mandatory for most employers. The majority of Swedish workers are covered by collectively bargained occupational pension plans. White-collar workers are mainly covered by the ITP plan. Blue-collar workers are mainly covered by the SAF-LO plan.

The SAF-LO plan is defined contribution in nature. In 2007 the ITP plan was reformed and divided into two main parts. ITP Part I, introduced in 2007, is defined contribution in nature and covers all employees born in or after 1979. ITP Part II covers all employees born before 1979. ITP Part II is mainly defined benefit in nature and based on final earnings, but contains some defined contribution elements.

The SAF-LO scheme's defined contribution accounts can be invested with approximately 25 different providers. The ITP Part I defined contribution accounts can be invested with 8 different providers. Currently, there is no ability to move pension savings between providers. However, there is a legislative proposal under consideration to allow pension savings movement between domestic and international providers which could take effect as early as May 2008.

The mainly defined benefit ITP Part II plan can be financed in one of three ways:

- Insurance with the insurance company Alecta;
- Book-reserved provision on the sponsoring employer's balance sheet; or,
- Pension fund.

Employers that choose to finance their ITP Part II plan via book-reserves or a pension fund must purchase credit insurance as protection in the event of bankruptcy.

Benefits and contributions

Normal retirement in ITP and SAF-LO is age 65, however, early retirement is possible from age 55.

After January 2007, the ITP plan allows benefits to be paid over a fixed period of not less than five years, instead of buying a lifelong pension.

Benefit indexation is discretionary. Employees who change employers have their rights preserved and indexed until retirement age.

There is full and immediate vesting.

All plans are non-contributory.

In DB plans financed via pension funds, it is the sponsoring employer's responsibility to correct any underfunding. However, there are no statutory minimum funding requirements and maximum recovery periods.

SWITZERLAND

Pension plan and fund types

Occupational pension plans have been mandatory in Switzerland since 1985. The relevant law is called BVG in German and LPP in French. The mandatory plan is a cash balance arrangement. The aggregate contribution rates are age-related and cover a specific slice of salary; the employer must pay at least half of the aggregate contributions. The interest rate credited to such contributions is set by law (2.25 percent since January 2004), as is the annuity conversion rate at retirement currently 7.1% for man and 7.15% for women, to be reduced to 6.8% by 2014). Mandatory death and disability benefits are also specified.

The mandatory pension plans are defined benefit plans for actuarial purposes, and they must prepare and submit actuarial valuation reports.

Many employers provide benefits that exceed the minimum BVG/LPP requirements, either within a single plan or by establishing a second plan. If the plan gives some form of excess-interest profit sharing beyond the statutory 2.25%, it simply becomes a more complex hybrid plan. . Plans may be of the traditional DB kind, but it is then necessary to maintain shadow BVG/LPP accounts to ensure that each member receives at least the mandatory benefits (whether on death, disability or retirement).

Separate DC plans, e.g. covering that portion of an employee's earnings that exceed the BVG/LPP or some higher salary ceilings, are not required to provide any guarantees.

Almost all Swiss pension plans are financed through a pension foundation. Even if the contributions are then directed to an insurance contract, the employer must still establish and maintain a pension foundation or participate in a collective foundation established by the insurer. Pension foundations are by law distinct from life insurance undertakings.

Benefits and contributions

Benefits may only be paid as annuities. Future benefit accruals can be adjusted downwards (for example, by lowering the return on the accounts, but not below the floor stipulated in the legislation), but only if the plan rules allow this and in order to correct underfunding.

There is no requirement to index benefits. Old-age pensions must be adjusted according to the pension fund's financial possibilities, as defined in the institution's regulations.

There is full and immediate vesting of mandatory benefits.

If an overfunded plan is terminated, all assets are allocated among plan members.

Pension plans are contributory. Employees pay up to a maximum of one-half of total contributions.

In case of overfunding, there is no possibility of paying any surplus to the employer.

In case of underfunding and a funding ratio of less than 90%, additional contributions from employers and employees may be required in order to bring the funding level to 90% within a period deemed reasonable by the regulator. However, future benefit accruals can also be reduced (see above) as well as certain special benefits (e.g. early retirement). In cases of serious underfunding, temporary contributions from pensioners can also be required.

UNITED KINGDOM

Pension plan and fund types

Pension plans can be of any type (DB, hybrid or DC).

Pension funds must be established as trusts in the United Kingdom and are by law distinct from life insurance undertakings.

Benefits and contributions

Up to one third of benefits may be paid in the form of a lump-sum. The rest must be paid as an annuity. Since 2006, there is more flexibility in retirement options, especially for DC plans, including income drawdown.

Deferred benefits and benefits in payment from DB plans accrued between 6 April 1997 and end 2004 must be indexed to the consumer price index up to 5 percent. Benefits accrued after the 2004 Pensions Act came into force are subject to a lower cap on statutory indexation (2.5%).

The social Security Act of 1986 reduced the maximum vesting period of pension benefits (whether financed by employer contributions only or jointly with employee) from 5 to 2 years of joining the plan. A refund of contributions is made with less than 2 years of service.

Section 67 of the Pensions Act of 1995 forbids any reduction in accrued rights. Prior to that, general trust law made it practically impossible to reduce accrued benefits.

Plan rules govern the application of assets from a terminated overfunded DB plan. Reversions to the sponsoring employer are allowed if permitted by the plan, but a special tax is applied. A solvent plan sponsor may terminate a DB or hybrid plan, but must cover any shortfall between the pension fund assets and the amount needed to buy immediate and deferred annuities from an insurance company. An insolvent plan sponsor's pension fund is absorbed into the benefit guarantee arrangement run by the Pension Protection Fund.

Plans can be contributory or non-contributory. The plan rules determine whether the employee contributes and at what rate.

In case of overfunding, a sponsoring employer may reduce contributions (or even enjoy "contribution holidays") or may claim back some of the excess under certain conditions (and subject to special tax rules). Another option is to fund retroactive benefit improvements.

In case of underfunding, the trustee must prepare a recovery plan that must be agreed with the sponsoring employer. Additional contributions may come from both employers and employees, but usually as the employee contribution rate is fixed in the plan rules only the employer makes additional contributions.

UNITED STATES

Pension plan and fund types

Pension plans can be of any type (DB, hybrid or DC). The main type of hybrid arrangements are cash balance plans.

Pension funds must be established as trusts in the United States and are by law distinct from life insurance undertakings.

Pension plan types

Benefits may be paid as lump-sums or annuities. Traditional defined benefit plans usually pay retirement benefits in the form of annuities. Cash balance and other hybrid plans, and DC plans, usually pay benefits in the form of lump sums.

There are no regulatory indexation requirements.

Benefits from DB and hybrid plans must vest within 5 years. While "anti-cutback" rules in general prohibit the reduction of vested benefits, trustees of Multi-Employer plans can cut benefits of workers (active and terminated) if the plan is weak. The trustees can eliminate lump sums, other payment options (except the life annuity to single employees and the joint & survivor annuity to married ones), other benefits/rights/features not a part of the accrued benefit (e.g., death benefits after retirement and disability benefits), early retirement subsidies and supplements, and benefit improvements in the past 5 years (which can mean some of the accrued benefit can be cut). Once the plan is healthy again, the trustees do not have to bring those benefits back.

Upon termination of a DB or hybrid plan, a healthy plan sponsor must purchase annuity contracts in the private insurance market for the employees' full accrued benefits (or make lump-sum payments if the participant and his/her spouse agree). An alternative to purchasing annuities is to "freeze" the plan, thus continuing to submit actuarial valuations and make any required contributions towards achieving full funding, and with the eventual objective of purchasing the annuities (preferably when the annuity market is more attractive). A DB or hybrid plan of an insolvent sponsor is usually transferred to the PBGC.

DB plans are usually non-contributory.

In case of overfunding, a sponsoring employer may reduce contributions (or even enjoy "contribution holidays") or may claim back some of the excess under certain conditions (and subject to special tax rules). Another option is to fund retroactive benefit improvements.

Underfunding must normally be addressed via additional employer contributions.