Risk-Based Supervision of Pension Funds

Emerging Practices and Challenges

Greg Brunner, Richard Hinz, and Roberto Rocha, Editors
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THE WORLD BANK
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Risk-Based Supervision of Pension Funds grew out of a project that was jointly conducted by the World Bank and the International Organization of Pension Supervisors (IOPS). The project was initiated in response to the increasing interest in the development of innovative approaches to pension supervision from the member countries of both institutions.

The volume provides an initial assessment of the development of risk-based supervision of pension funds in four countries that have been pioneering the development of risk-based supervision methods in various forms. The volume is comprised of a summary chapter and in-depth studies of the experience in four individual countries—Australia, Denmark, Mexico, and Netherlands. These four country studies were prepared by experts familiar with the systems in each of the countries. The studies have been edited by World Bank staff to ensure a consistent approach to the analysis of the various countries’ systems.

Models of risk-based supervision demonstrate the benefits of moving away from an approach based on strict compliance, specific rules, and quantitative controls toward an approach that puts more emphasis on the identification and management of relevant risks. A risk-based approach encourages supervised entities to place a greater focus on risk management in their daily operations, which promotes a stronger pension system and more effective outcomes for the members of the system.
It is also expected that moving to a risk-based approach to supervision will enhance the ability of supervisors to focus resources on areas of highest risk, which will, over time, result in a more efficient use of supervisory resources.

The utilization of risk-based methods originates primarily in the supervision of banks. In recent years it has increasingly been extended to other types of financial intermediaries, including insurance companies and pension funds. The trend toward risk-based supervision of pensions reflects an increasing focus on risk management in both banking and insurance, which is based on three key elements: capital requirements, supervisory review, and market discipline. Although similar in concept to the techniques developed in banking, application to pension funds has required modifications, particularly for defined-contribution funds that transfer investment risk to fund members.

This report begins with a summary (chapter 1) prepared by World Bank staff, which provides an overview of the design and experience of risk-based pension fund supervision. The countries examined provide a range of experience that illustrates both the diversity of pension systems and the approaches to risk-based supervision, as well as a commonality of the risk-based focus on sound risk management. Chapter 1 provides a description of the main components of risk-based supervision in the four countries, and it examines the various components of these systems, including the risk management architecture, risk-based solvency standards, and supervisory risk scoring systems.

The book presents systems that have only recently been introduced, or are still in the development phases, so any observations are preliminary. Impacts are observed on the composition of pension fund asset portfolios, the extent of asset/liability mismatches, and the conduct of pension fund supervision. An initial evaluation of the outcomes achieved in relation to the underlying objectives suggests that risk-based supervision has the potential to improve the quality of risk management.

The Australian case provides a model of risk-based supervision that applies to both defined-contribution and defined-benefit pension funds, covers a broad range of institutions in terms of size and complexity, and applies to both open “public offer” funds and closed occupational funds. The Australian case provides a structured methodology for ranking pension funds according to the relative threat of failure, weights this in accordance with the impact of such a failure, and maps this to a supervisory response framework. The Australian model demonstrates how defined-contribution pension funds can be subjected to risk-based assessment. The model
makes a distinction between larger funds that are subject to detailed assessment and smaller funds that are subject to a streamlined and more automated assessment.

The Danish case provides a model of risk-based supervision applied in a voluntary occupational system that has achieved a high degree of coverage through collective agreements. Danish funds operate on a defined contribution basis but offer guarantees that result in defined-benefit type of arrangements. The model demonstrates how the move toward a risk-based supervision can be a gradual process and need not involve the development of a holistic risk-rating model. The “traffic light” approach utilizes a stress test that can feed into a broader and more subjective assessment of pension funds. Nevertheless the results are still used to guide the intensity and scope of supervision.

The Dutch case applies a sophisticated risk-based system in a defined-benefit pension environment. The Dutch have integrated a risk scoring system with sophisticated solvency standards designed to ensure adequate buffers to absorb investment and other risks. The analysis framework establishes a comprehensive set of tools to evaluate all the key risks faced by pension funds. Like Australia, the motivations for developing this approach include greater consistency in procedures, increased transparency, and improved allocation of supervisory resources. A risk-based capital rule establishes buffers and funding levels based on the risk profile of the institution and reflects the basic concepts that are aligned with the Solvency II model for insurance companies being developed in Europe.

The Mexican case provides an alternative model of risk-based supervision in a defined-contribution setting that is in the early stages of implementation, and which includes a Value at Risk (VaR) approach to controlling market risk within pension funds, as well as detailed regulations on internal risk management. The Mexican case provides an interesting contrast to the Australian case, due to the introduction of VaR limits and the more prescriptive guidelines on internal risk management. Pension supervisors in many countries that have introduced mandatory defined-contribution systems in the past two decades may benefit from an in-depth analysis of these two approaches to risk-based supervision of defined-contribution funds.
This volume is the product of a joint project on risk-based supervision of pension funds coordinated by the World Bank in collaboration with the International Organization of Pension Supervisors (IOPS). Gregory Brunner, Richard Hinz, and Roberto Rocha coordinated the project from the World Bank side, and Fiona Stewart was the coordinator from the IOPS side.

Gregory Brunner, Richard Hinz, and Roberto Rocha edited the volume and wrote chapter 1, which summarizes the country studies. The authors are grateful to Luiz Mario Hernandez Acevedo, Erik Brink Andersen, Laura Ard, Dirk Broeders, Gregorio Impavido, David Madero, Heinz Rudolph, Peter Skjodt, Constantinos Stephanou, and Dimitri Vittas for their useful inputs and comments during the drafting of this summary chapter.

Very detailed country studies prepared by a number of expert consultants were the basis for the chapters on the Netherlands, Denmark, Australia, and Mexico.

Chapter 2 was prepared by Rein van Dam, former head of pension supervision in the Netherlands. It was restructured and updated by Richard Hinz of the World Bank. The authors are grateful to the staff of the Dutch National Bank for access to supervision material and fruitful
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# Abbreviations and Acronyms

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<th>Description</th>
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<tbody>
<tr>
<td>ABO</td>
<td>accrued benefit obligations</td>
</tr>
<tr>
<td>AFM</td>
<td>Authority for the Financial Markets</td>
</tr>
<tr>
<td>ALM</td>
<td>asset liability management</td>
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<tr>
<td>APP</td>
<td>Actuarial Principles for Pension Funds</td>
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<td>APRA</td>
<td>Australian Prudential Regulation Authority</td>
</tr>
<tr>
<td>ATP</td>
<td>Labor Market Supplementary Pension</td>
</tr>
<tr>
<td>CBS</td>
<td>Central Bureau of Statistics</td>
</tr>
<tr>
<td>CONSAR</td>
<td>Comisión Naional del Sistema de Ahorro para el Retiro</td>
</tr>
<tr>
<td>DB</td>
<td>defined benefit</td>
</tr>
<tr>
<td>DC</td>
<td>defined contribution</td>
</tr>
<tr>
<td>DIA</td>
<td>Danish Insurance Association</td>
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<tr>
<td>DNB</td>
<td>De Nederlandsche Bank</td>
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<tr>
<td>DFSA</td>
<td>Danish Financial Supervisory Authority</td>
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<tr>
<td>ETF</td>
<td>exchange traded funds</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>FIRM</td>
<td>Financial Institution Risk Analysis Method</td>
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<tr>
<td>FTK</td>
<td>Financieel Toetsings Kader</td>
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<tr>
<td>FSA</td>
<td>Financial Services Authority</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<tr>
<td>IAIS</td>
<td>International Association of Insurance Supervisors</td>
</tr>
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<td>ICA</td>
<td>individual capital assessment</td>
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</tbody>
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### Abbreviations and Acronyms

<table>
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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>IOPS</td>
<td>International Organization of Pension Supervisors</td>
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<td>ISC</td>
<td>Insurance and Superannuation Commission</td>
</tr>
<tr>
<td>MARS</td>
<td>Model for the Analysis of Risk</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OTC</td>
<td>over the counter</td>
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<tr>
<td>PAIRS</td>
<td>Probability and Impact Rating System</td>
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<tr>
<td>PAYG</td>
<td>pay-as-you-go basis</td>
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<tr>
<td>RASR</td>
<td>risk-adjusted solvency requirements</td>
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<tr>
<td>RBS</td>
<td>risk-based supervision</td>
</tr>
<tr>
<td>SG</td>
<td>superannuation guarantee</td>
</tr>
<tr>
<td>SOARS</td>
<td>Supervisory Oversight and Response System</td>
</tr>
<tr>
<td>SP</td>
<td>Special Savings Pension</td>
</tr>
<tr>
<td>SWG</td>
<td>Superannuation Working Group</td>
</tr>
<tr>
<td>VaR</td>
<td>Value at Risk</td>
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This chapter provides a review of the design and experience of risk-based pension fund supervision in several countries that have been leaders in the development of these methods. The use of risk-based methods, which originated primarily in the supervision of banks, has increasingly been extended to other types of financial intermediaries, including pension funds and insurers. The trend toward risk-based supervision (RBS) of pensions is closely associated with movement toward the integration of pension supervision with banking and other financial services into a single national authority. Although similar in concept to the techniques developed in banking, the application to pension funds has required modifications, particularly for defined contribution (DC) funds that transfer investment risk to fund members. The countries examined provide a range of experience that illustrates the diversity of pension systems and approaches to RBS, as well as the commonality of the focus on sound risk management and effective supervisory outcomes. The chapter provides a description of pension supervision in Australia, Denmark, Mexico, and the Netherlands and an initial evaluation of the results achieved in relation to the underlying objectives.
Introduction

Over the past several decades privately managed pensions have evolved from a supplemental form of DC to become an important—and in some cases central—element of social insurance systems. Their supervision has made a similar transition to meet the requirements of this new role. It has evolved from ensuring compliance with tax laws and labor contracts and relatively simple methods to limit investment risk, toward a much more comprehensive approach ensuring proper management of all the risks associated with complex institutions relied on to provide secure sources of retirement income.

The wave of innovation and reforms in Latin America and Central and Eastern Europe beginning in the early 1980s transformed pension funds from primarily employer-sponsored defined benefit (DB) arrangements into more diverse forms, including most significantly the emergence of special purpose financial intermediaries operating on a DC basis. The move toward DC funds largely removed the capacity to rely on employers to guarantee outcomes and placed financial risks squarely on the shoulders of members. This transition shifted the nexus of supervision from controlling agency risks to managing systemic financial and operational risks. Initially the new supervision regimes were based on simple portfolio limits with very proactive compliance enforcement. Limiting downside risk over short periods through investment controls was the primary concern; the risk-return efficiency and effective capital allocation were secondary considerations.

By the beginning of the new millennium several factors combined to accelerate these changes in supervision methods. Private pension funds in a number of countries accumulated asset levels exceeding those of more traditional financial institutions, in some cases more than 100 percent of gross domestic product (GDP), leading to a commensurate increase in attention to their systemic importance. A “perfect storm” of rapidly declining interest rates coincident with collapsing equity prices exposed the fragility of the loose funding requirements for the remaining DB schemes. Concerns about the capacity of the new DC plans to produce adequate levels of retirement income also focused attention on the efficacy of their design and operation. This attention led a number of countries to begin to adopt supervision systems based on various risk-based approaches that established new standards for the operation of pension funds and guided the conduct of their oversight activities.
This chapter reviews the experience in four of the pioneers in developing RBS for pension funds: Australia, Denmark, Mexico, and the Netherlands. These countries each have large and well-established pension systems that provide a useful initial review because they constitute a representative sample of the characteristics of pension systems worldwide, including occupational and open pension funds as well as both DB and DC arrangements. The other chapters are based on individual country studies that form part of a joint project of the World Bank and the International Organization of Pension Supervisors (IOPS), as well as discussions with pension supervisors and market participants in these countries. The case studies provide a more detailed analysis of individual countries (Berstein and Chumacero 2006a; Hinz and Van Dam 2006; Andersen and Van Dam 2006; and Thompson 2006).

The chapter is structured as follows. The second section reviews the origins of RBS in banking and insurance and the progress achieved in developing further the risk-based approach under the Basel II and Solvency II agreements. The third section provides an overview of the pension systems of the four countries and the factors that have motivated the introduction of RBS. The fourth section—the core of the chapter—provides a more in-depth discussion of the main elements of RBS of pension funds in the four countries. The fifth section is a preliminary assessment of the impact of the new supervisory approach on the pension sectors of each country, as well as some observations on the challenges that supervisors will face in the future. The sixth section draws some preliminary lessons for other countries.

**Conceptual Origins of Risk-Based Supervision: Basel II and Solvency II**

The movement toward RBS approaches can be traced to the development of early warning systems for banks. The earliest of these systems was the CAMEL—a rating system that comprised the components of capital adequacy, asset quality, management factors, earnings, and liquidity—which was adopted by the United States in the 1980s. In 1988 the Basel Committee on Banking Supervision implemented the Capital Adequacy Accord (Basel I), which provided a risk-based framework for assessing the capital adequacy of banks to cover credit risks. The development of this framework was an important step in the path to RBS; the framework sought to ensure an adequate level of capital in the banking system by applying weighting to credit exposures based on broad risk classifications.
During the 1990s a number of supervisors implemented risk assessment and early warning systems. In 1993 the Bank of Italy implemented an off-site monitoring system called PATROL; PATROL comprised the components of capital adequacy (PATrimonio), profitability (Redditività), credit risk (Rischiosità), management (Organizzazione), and liquidity (Liquidità). In 1997 the German Federal Supervisory Office introduced an early warning and monitoring system called the BAKred Information System (BAKIS). In the same year the French Banking Commission introduced an offsite supervisory bank rating system called the Organization and Reinforcement of Preventative Action (ORAP). In 1998 the Financial Service Authority in the United Kingdom introduced its Risk Assessment, Tools of Supervision, and Evaluation model (RATE), a comprehensive bank risk-rating system; the Dutch National Bank (DNB) implemented a comprehensive system called Risk Analysis Support Tool (RAST), which has evolved into the Financial Institutions Risk analysis Method (FIRM) model applied to all financial entities regulated by DNB today.

In 1999 the Basel Committee began the process of replacing the Basel I accord with a more contemporary framework that requires banks to improve risk management and corporate governance in conjunction with improved supervision and transparency. The new framework, known as Basel II, is designed to encourage good risk management by tying regulatory capital requirements to the results of internal systems and processes assessment, thereby creating incentives for improvements in risk management. In addition to making the calculation of regulatory capital more risk sensitive and recognizing the quality of internal risk management systems, the framework added two pillars to the model: the supervisory review process and the market discipline. The three pillars of the new model are shown in table 1.1.

### Table 1.1. The Three Pillars of Basel II

<table>
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<th>Pillar 1</th>
<th>Pillar 2</th>
<th>Pillar 3</th>
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<tr>
<td>Minimum capital requirements</td>
<td>Supervisory review process</td>
<td>Market discipline</td>
</tr>
<tr>
<td>Risk-based capital rule reflecting:*</td>
<td>• Regulatory compliance</td>
<td>• Meaningful disclosure</td>
</tr>
<tr>
<td>• Market risk</td>
<td>• Reporting obligations</td>
<td></td>
</tr>
<tr>
<td>• Credit risk</td>
<td>leading to more</td>
<td></td>
</tr>
<tr>
<td>• Operational risk</td>
<td>transparency and</td>
<td></td>
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<tr>
<td></td>
<td>accountability</td>
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*The interest rate risk on the banking book (loans, deposits) is not included in pillar one of Basel II, but is included in pillar two, as well as in pillar one of Solvency II.*

Source: Bank for International Settlements 2006; authors.
The Basel II framework provides banks with a choice between a standardized approach to calculating credit risk using specified risk factors and an internal ratings-based approach subject to explicit approval by the bank supervisor that would allow banks to use their internal ratings systems for credit risk. The framework has been built through a process of extensive exploration by regulators of emerging industry practices in risk management and considerable testing and calibration.

Pillar one requires implementation of an effective and comprehensive risk management system that includes a proper organizational structure; policies; procedures; and limits for credit, market, and operational risk. Banks are required to have an integrated approach to risk management that covers the risks in particular business segments as well as the bank as a whole.

Pillar two—supervisory review—allows supervisors to evaluate a bank’s assessment of its own risks and assure themselves that the bank’s processes are robust. Supervisors will have the opportunity to assess whether a bank understands its risk profile and is sufficiently capitalized against its risks. This pillar will encourage adoption of risk-focused internal audits, strengthened management information systems, and the development of risk management units.

Pillar three—market discipline—ensures that the market is provided with sufficient information to allow it to undertake its own assessment of a bank’s risks. It is intended to strengthen incentives for improved risk management through greater transparency. This should allow market participants to better understand the risks inherent in each bank and ultimately support banks that are well managed at the expense of those that are poorly managed.

The movement toward greater risk focus is also reflected in the insurance industry. The International Association of Insurance Supervisors (IAIS) is working to develop a common international framework for assessing the solvency of insurers. At a regional level, work is underway in Europe on the Solvency II project that aims to adopt a risk-based approach to capital requirements for insurance companies and introduce qualitative requirements for senior management, risk management, model validation, and internal controls. There will also be recognition by supervisors of internal modeling in collaboration with the actuarial profession. Solvency II will involve a three-pillar approach similar to that of Basel II, introducing a supervisory review process and enhanced transparency.

The current solvency framework in Europe dating from the early 1970s defines capital requirements for insurers in terms of solvency
margins typically based on simple rules applied to technical provisions or premiums. Under Solvency II the first pillar will define the resources that a company needs to be considered solvent. It will define two thresholds for capital: the solvency capital requirement will set a threshold for supervisory action, and the minimum capital requirement will provide a basis for stronger action or even withdrawal of the company’s license to write new business. As with Basel II, the capital requirement can be calculated using either a simple standardized model or an internal model approved by the supervisor. Pillar two will take into account qualitative measures of risk control focusing on risk management processes, individual risk capital assessment, and aspects of operational risk, including stress testing. Pillar three will address disclosure requirements incorporating more consistent international accounting standards. In many European countries that operate DB pension schemes or guarantee arrangements involving technical reserving, the rules applying to insurance companies may also apply to pension entities.

Across the globe the trend is inexorably moving toward improved risk management based on the three key elements outlined in figure 1.1. First, institutions themselves are focusing on improving their own risk management. They are developing risk management strategies, and they are measuring and assessing risk in a more comprehensive manner. In many institutions this process involves the creation of dedicated risk

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**Figure 1.1. The Basic Risk Management Architecture**

<table>
<thead>
<tr>
<th>For the institution</th>
<th>For the supervisor</th>
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<tbody>
<tr>
<td>• Risk management strategy</td>
<td>• Regulations, including minimum risk management standards</td>
</tr>
<tr>
<td>• Board committees</td>
<td>• Risk-based solvency rule</td>
</tr>
<tr>
<td>• Risk management functions in the managerial structure</td>
<td>• Risk-scoring model guiding supervisory actions</td>
</tr>
<tr>
<td>• Internal controls</td>
<td>• Internal organization of the agency, with specialist risk units</td>
</tr>
<tr>
<td>• Reporting responsibilities</td>
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</table>

**Market discipline**

The contribution of the actuary, auditor, fund members, rating companies, and market analysts to sound risk management

*Source: Authors.*
management units. These units are implementing controls to ensure that risk management polices are followed and that information is presented to management and board in a meaningful fashion.

Supervisors are responding by building up their ability to assess risk. The basic tools of onsite and offsite supervision are taking on a risk focus, and specialist risk units are being created with expertise to tackle complex issues. Many regulators are facilitating improved risk management by implementing regulatory standards and providing guidance. Finally, more external parties are encouraged to take a role in the risk assessment process, either through broadening the role of some traditional players like auditors and actuaries, or through encouragement of greater scrutiny by outside parties by means of greater transparency of reporting.

Introduction of Risk-Based Supervision for Pensions

Overview of the Four Pension Systems

An overview of the private pension systems of the four countries provides an understanding of the factors that motivated the introduction of RBS. Further background information on the pension systems of these countries is provided in the individual country papers (Andersen and Van Dam 2006; Berstein and Chumacero 2006a; Hinz and Van Dam 2006; and Thompson 2006).²

As shown in table 1.2, all of the countries have mandatory or quasi-mandatory private pension systems. In Australia and Mexico, contributions to private pension plans are imposed by legislation. In Denmark and the Netherlands, contributions take place in the context of collective labor agreements that are classified as quasimandatory because most workers are covered by these agreements. The mandatory or quasimandatory nature of contributions results in high coverage rates except in Mexico. The lower coverage ratio in Mexico, despite the legal obligation to contribute, is explained by the large share of the labor force in the informal sector and the lower number of active contributors relative to the total universe of pension fund members.³

The pension systems in these countries are very large, with assets exceeding 100 percent of GDP in all cases except Mexico. The relatively small size of assets relative to GDP in the Mexican case is due to the lower coverage ratio and the fact that the Mexican system is much younger, having started operations only in 1998. However, the mandatory nature of contributions to individual accounts implies that the private pension system will continue growing quickly and increase its share in the financial sector.
Three countries have a large number of funds, ranging from 111 in Denmark to 1,000 in Australia; these funds may operate more than one pension plan. Many of these are occupational funds structured as non-profit trusts or foundations originally created on a voluntary basis and operating for several decades. They include single funds and larger multi-employer or industry-wide funds. Australia and Denmark also have several for-profit commercial institutions managing pension funds—including life insurance companies in the Danish case.

Mexico has only 18 funds currently licensed. The difference in the number of funds is a result of the different origins and characteristics of the Mexican system. The Australian, Danish, and Dutch systems have their roots in voluntary arrangements with employers. Most funds were initially established with liberal licensing and authorization rules designed to encourage participation and coverage. By contrast, the Mexican system was established as a mandatory system of open funds subject to a strict regulatory framework, including much stricter licensing rules.4

Dutch pension funds manage primarily DB plans5; the Netherlands has been one the few countries that has successfully resisted the move toward DC plans. The Danish system is a DC system that offers benefit guarantees and operates on a risk-sharing or profit-sharing basis. The guarantees introduce a core liability and the risk of insolvency of the provider.

Table 1.2. Main Characteristics of the Four Private Pension Systems, December 2005

<table>
<thead>
<tr>
<th>Mandate</th>
<th>Coverage (% of labor force)</th>
<th>Assets (% GDP)</th>
<th>Number of funds</th>
<th>Legal structure of pension funds</th>
<th>Type of plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>Quasi-mandatory</td>
<td>90</td>
<td>120</td>
<td>700</td>
<td>Occupational</td>
</tr>
<tr>
<td>Denmark</td>
<td>Quasi-mandatory</td>
<td>80</td>
<td>124</td>
<td>111</td>
<td>Mostly DC with absolute return guarantee (DB-like)</td>
</tr>
<tr>
<td>Australia</td>
<td>Mandatory</td>
<td>90</td>
<td>104</td>
<td>1,004</td>
<td>DC</td>
</tr>
<tr>
<td>Mexico</td>
<td>Mandatory</td>
<td>29</td>
<td>8</td>
<td>18</td>
<td>DC with ceiling on downside risk (VaR)</td>
</tr>
</tbody>
</table>

Source: Hinz and Van Dam 2006; Andersen and Van Dam 2006; Thompson 2006; Bernstein and Chumacero 2006a; and Rofman and Luchetti 2006.

Note: a. Denmark: 44 corporate funds, 30 industry-wide funds, 37 life insurance companies.

b. Australia: 681 corporate funds, 86 industry-wide funds, 194 retail funds, 43 public sector funds. The figures do not include small funds.

VaR = value at risk.
Therefore, the Danish system exhibits some of the characteristics of a DB system, although it operates with more flexible rules than pure DB systems and seems to be moving in the direction of DC plans with fewer guarantees.

Australian pension funds manage primarily traditional DC plans with no formal guarantees. There are still some DB plans, but these are mostly restricted to public sector funds and account for a small share of total assets. Australia best represents a pure DC system.

Mexican funds, by contrast, manage their DC plans under a new regulatory framework that includes a limit on downside risk defined by a ceiling on the daily absolute value at risk (VaR). This is a significant departure from the setup introduced in Chile and other countries in Latin America and Central Europe that relied on quantitative portfolio restrictions to manage risks. Most of these countries have introduced minimum relative return guarantees that intensify herding behavior and lead pension funds to base their investment strategies on tracking errors or relative VaRs vis-à-vis the benchmark portfolio. Pension fund managers in these countries are more concerned with relative risk (the risk of deviating from the benchmark and facing a capital call to honor the relative return guarantee) than absolute risk. Other countries are following the Mexican experiment with interest.

Factors Motivating the Adoption of Risk-Based Supervision

Some of the factors that have motivated the introduction of RBS of pension funds are common to all the four countries, while others seem to be country-specific. Table 1.3 summarizes the motivating factors identified in the individual country studies.

Preventing underfunding of DB plans was a strong factor motivating the adoption of RBS in the Netherlands. Dutch funds enjoyed the equity boom in the 1990s and started taking contribution holidays when funding ratios reached levels considered as high. However, these funding ratios proved insufficient to absorb the adverse price movements in the early 2000s—the crash of the equity market combined with the drop in interest rates led several funds to become underfunded or only marginally funded. Regulators interpreted the outcome as indicating a weakness in the supervisory approach that was perceived as lacking sufficient foresight and concern for the risks facing the institutions.

The introduction of a more risk-based approach to supervision in Denmark was also motivated by a concern with the solvency of pension providers, but the surrounding conditions were different from those in the Netherlands.
Table 1.3. Factors Motivating the Adoption of Risk-Based Supervision

<table>
<thead>
<tr>
<th>Policy of reducing the risk of underfunding, insolvency of DB plans (or DC plans with guarantees) due to sudden and adverse price movements</th>
<th>Policy of limiting maximum loss to members of DC plans due to adverse movements in asset prices</th>
<th>Search for efficiency gains, especially from improvements in risk/return trade-off</th>
<th>Increasing complexity of financial instruments and markets</th>
<th>Effort to allocate efficiently scarce supervisory resources</th>
<th>Spillover from bank/insurance supervision; change in approach after integration of agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mexico</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Source: Authors.
• First, the new Danish traffic-light system preceded the equity crash in the early 2000s. By the time equity prices collapsed and interest rates declined, the new system was already in place.
• Second, the new system was introduced as a quid pro quo for a more liberal investment regime in which the ceiling on equity investments was raised to 70 percent. Danish funds were allowed to make riskier investments provided that they held sufficient capital to absorb the risk.
• Third, the Danish system operates on a risk-sharing basis, which means that the system has buffers than can absorb at least part of the adverse price movements.

These differences imply that the desire to prevent underfunding was more important in the Netherlands than in Denmark. However, there was still concern with provider solvency in Denmark, justifying the inclusion of this factor.

Concern with adverse price movements was also one of the motivating factors in Mexico, although the Mexican system is a DC system where the investment risk is shifted to the individual and there is little risk of provider insolvency. The policy concern in Mexico was not the risk of provider insolvency, but the exposure of retiring workers to extreme downside losses and the extreme volatility of benefits across cohorts.\(^6\) It is interesting to note that, as in the Danish case, the adoption of a VaR ceiling in Mexico and the introduction of strict risk management rules were a quid pro quo for the introduction of a more liberal investment regime that allowed pension fund managers to make riskier investments and use derivatives.

The search for efficiency gains was also one of the main motivating factors in Denmark and Mexico. In both cases, the investment regime was liberalized and pension funds were allowed to invest more in equity and other assets perceived as risky. In Mexico, pension funds were allowed to use derivatives, subject to certification by the supervisor. The relaxation of the investment regime was motivated by perceptions that pension funds were constrained below the efficient investment frontier and that there was scope for longer-term improvements in the risk-return tradeoff. The relaxation of investment rules was accompanied by other rules designed to strengthen risk management and constrain excessive risk-taking.

The need to establish rules that enabled pension funds to take advantage of the increasing sophistication and complexity of financial instruments and markets was a motivating factor in all four countries. The creation of
these rules reflects a more general recognition by financial supervisors worldwide that it is no longer feasible to monitor all of the operations of financial institutions; a more effective approach entails ensuring that these institutions have sound risk management practices and internal controls.

In Australia, Denmark, and the Netherlands, the adoption of RBS was also driven by the need to allocate scarce supervisory resources efficiently. Supervisors need to monitor a large number of institutions, especially in Australia and the Netherlands. A traditional, compliance-based supervision would be either too costly or ineffective in these cases. The risk-based approach allows supervisors to focus their scarce resources in the institutions exposed to greater risks and/or with weaker risk management capacity. This factor was less important in Mexico, where only 18 funds are allowed to operate.7

The integration of financial supervisory functions in one entity also seems to have been a motivating factor in Australia, Denmark, and the Netherlands. The adoption of RBS in pensions seems to have been accelerated in the countries that integrated their agencies and adopted the same basic supervision approach to all financial institutions. There was in these cases an accelerated transfer of supervisory expertise from banking and/or insurance supervision to pension supervision. Mexico was again the exception, as the supervisory agency Comision Nacional del Sistema de Ahorro para el Retiro (CONSAR) was a single entity when the new approach was adopted and has remained a single entity.

The Main Elements of Risk-Based Supervision for Pensions

Common Objectives and Elements of Design

One of the main objectives of RBS in banking and insurance is to ensure that institutions adopt sound risk management procedures and hold appropriate levels of capital. Regulators and policy makers are aware that many leading institutions have already adopted good risk management practices, and some companies would already be able to meet the more demanding requirements of Basel II and Solvency II. These financial institutions recognize that sound risk management practices are in the interest of stakeholders and are rewarded by the market, as indicated by the growing consideration of the quality of internal risk management by rating companies.8

Pension supervisors face challenges that are in many aspects similar to those faced by bank and insurance supervisors. They recognize the need to evolve to an approach that emphasizes sound risk management by the
supervised institutions in order to strengthen financial stability and ensure more efficient outcomes for pensioners. They are also aware that several pension funds in their countries have already started adopting good risk management practices. The challenge that pension supervisors face is to ensure that all licensed institutions comply with minimum standards of risk management and hold appropriate levels of capital in the systems where this is relevant.

In order to examine the way pension supervisors have addressed this challenge, it is useful to consider the three main groups of players involved in the overall architecture of risk management (figure 1.1). The first group consists of the supervised institutions. The second group is the supervisory agency, and the third consists of other market participants that may have the capacity to influence the decisions and actions of pension funds. These include auditors, actuaries, fund members, rating companies, and market analysts.

One of the main objectives of RBS is to ensure sound risk management at the institutional level. As indicated in figure 1.1, the capacity of the institution to identify, measure, and manage all the relevant risks would be reflected in the following: the presence of a sound internal architecture of risk management that includes a reasonable risk management strategy; evidence of board involvement in risk management; the existence of risk management functions performed by competent, independent, and accountable professionals; and proper internal controls.

The question is what tools supervisors have to ensure these outcomes. As indicated in figure 1.1, the broad elements of the supervisory tool kit include the regulations issued by the supervisor, including direct regulations focused on the risk management architecture and risk management procedures; a risk-based capital rule (in the environments where this is relevant); and a risk-scoring model that guides supervisory strategies and procedures. In addition, the supervisory agency will organize itself consistent with the requirements of these elements by establishing some units focused on managing the relationships with the supervised entities and other technical units more specialized in the measurement and analysis of different type of risks.

The third group of relevant players includes those market participants who may contribute to market discipline and the adoption of sound risk management practices by the institutions. The role of some of these players depends on regulations issued by the supervisor as well. For example, the role of the auditor may be enhanced by expanding the scope of the audits to include an assessment of the effectiveness of risk
management systems and internal controls, as well as whistle-blowing obligations. The influence of fund members, rating companies, and other market analysts may be strengthened by good accounting, auditing, and disclosure rules issued by the supervisor.

It is possible to relate the main components identified in figure 1.1 with the three pillars in the Basel II/Solvency II framework. The risk-based solvency rule constitutes pillar one and is relevant in DB systems or DC systems that offer benefit guarantees. Pillar two represents the supervisory process. Figure 1.1 emphasizes risk-scoring models, because these models have become essential tools around which pension supervisors organize their offsite and onsite supervisory actions. The third pillar, market discipline, is directly represented in figure 1.1. This pillar is expected to play an essential role in the Basel II and Solvency II frameworks, but its relevance for pension supervision depends more closely on the particular type of system, as discussed below.

**Main Components of Pension Supervision in the Four Countries**

As illustrated in table 1.4, pension supervisors in the four countries have developed these tools to varying degrees, reflecting the different environments. In Australia, Denmark, and the Netherlands, the institutions must comply with corporate governance rules that emphasize the role and responsibilities of the board. The institutions must also have a risk management plan or risk management guidelines, but they do not have to adopt a specific architecture of risk management. By contrast, all Mexican pension funds have to adopt a very specific and detailed risk management architecture laid out in a specific regulation issued by the supervisor.

The different approach followed in Mexico reflects the particular characteristics of the Mexican system, including the much smaller number of relatively homogeneous institutions. It is possible to implement this type of regulation in a system with only 18 pension funds. It would be very difficult—and also questionable—to implement this type of regulation in a system with 1,000 pension funds, including large and small funds with very different capacities. Supervisors could generate severe inefficiencies by imposing a one-size-fits-all type of regulation. Of course, the buildup of risk management capacity in the institutions is a supervisory objective in Australia, Denmark, and the Netherlands; however, supervisors try to achieve this objective through other means, such as the incentive effects associated with their risk-scoring model or sanctions on institutions with weak capacity to manage risks.
Table 1.4. Main Components of Risk-Based Supervision in the Four Countries

<table>
<thead>
<tr>
<th>Requirements for the internal risk management architecture</th>
<th>Risk-based solvency rule</th>
<th>Risk scoring model</th>
<th>Role of market discipline/disclosure</th>
<th>Organization of supervision agency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Netherlands</strong></td>
<td>Internal review of Board's management of long-term risks</td>
<td>Fully developed risk-based solvency rule</td>
<td>Fully developed and unified framework, considering quantitative and qualitative aspects</td>
<td>Low; Possibly higher in some cases through single employer balance sheet</td>
</tr>
<tr>
<td><strong>Denmark</strong></td>
<td>Board of Directors required to issue risk management guidelines</td>
<td>Hybrid rule: solvency margin + risk-based traffic light system</td>
<td>Partially developed</td>
<td>High</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td>Risk management strategy and plan required for licensing</td>
<td>No formal solvency rules for DC plans</td>
<td>Fully developed and unified framework considering quantitative and qualitative aspects; Applied to all financial institutions with relevant adaptations</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Mexico</strong></td>
<td>Very specific and detailed architecture laid out in a regulation issued by the supervisor</td>
<td>No formal solvency rules for DC plans; However, VaR ceilings to limit downside risk</td>
<td>Partially developed: Elements of risk scoring for operational risk and financial risk</td>
<td>Medium/High</td>
</tr>
</tbody>
</table>

Source: Authors.

Note: a. Australia imposes basic technical solvency requirements for the remaining DB funds. The size of solvency buffer is assessed as part of PAIRS.
Risk-based solvency rules are relevant in Denmark and the Netherlands because of the nature of their systems. Dutch supervisors have recently implemented a detailed and formal risk-based solvency rule that addresses longevity, market, credit, currency, and interest rate risks and that penalizes asset-liability mismatches. Denmark has adopted a model that can be classified as hybrid. The formal solvency rule is not risk-based, but it is complemented by a standard stress test called the “traffic-light system” that entails a test of the resilience of the institution in response to fluctuations in interest rates and asset prices. Although the Danish traffic-light system shares some common elements with the new Dutch solvency rule, it also has some important differences. It is not a formal solvency rule, as already noted, and is applied in the context of a risk-sharing system, which implies a lower risk of insolvency. Risk-based solvency rules are not relevant in DC systems such as Australia and Mexico, but Mexican regulators have adopted a ceiling on daily VaR that limits the exposure of DC fund members to downside risk.

Australia and the Netherlands have made substantial progress in building comprehensive risk-scoring models that are applied to all financial institutions, with adaptations depending on the type of institution. In the Netherlands, solvency indicators are considered as inputs to the risk-scoring model, providing a link between the risk-based capital position and the risk scores. It is interesting to note that the Australian risk-scoring model takes into consideration the institution’s exposure to financial risks (and the capacity to manage these risks) in the risk scores, even though it is applied to DC plans where financial risks are shifted to the individual members. The Australian Prudential Regulatory Authority (APRA) examines the adequacy of investment management processes, including the investment strategies, asset allocation, diversification, liquidity needs and performance measurement, and monitoring and benchmarking. It looks not only for compliance with the broad investment rules but also at how risk management compares to good industry practices. Denmark and Mexico have made only partial progress in this area. Both countries have developed elements of a risk-scoring model to guide their supervisory actions, but they have not yet developed full models.

Market discipline does not seem to play a very important role in the Netherlands, although the disclosure of the fund’s solvency position and its implications for the sponsor may impose an element of discipline in single-employer funds. Market discipline plays a more important role in Denmark and Mexico, where there is more scope for individuals or sponsors to change the provider, and supervisors in both countries ensure a high level of disclosure to facilitate comparisons and well-informed decisions.
Finally, all the supervisory agencies have reorganized themselves to conduct a type of supervision that requires more specialized skills. In Australia, Denmark, and the Netherlands units focus on the relationship with the institutions and specialized units providing expert or technical support on different types of risks. The Mexican supervisory agency has a particular setup that mirrors the internal risk management architecture imposed by regulation.

**Regulatory Requirements for Risk Management Architecture**

Table 1.5 provides more detail on the regulatory requirements for the internal risk management architecture. Australia, Denmark, and the Netherlands impose some requirements on risk management as part of licensing or initial registration procedures. This includes the elaboration of a risk management plan or risk management guidelines. These requirements are not very detailed, with the supervisors allowing for differences depending on the size of the institution. These countries do not seem to impose specific regulatory requirements on the internal risk management architecture, although Dutch funds must have an internal body reviewing long-term risk management, as well as independent risk management functions.

Mexican supervisors have followed a different approach, issuing a direct regulation that specifies in detail all the elements of the internal risk management architecture. All pension funds must have two board committees dedicated to risk management, one focused on operational risk and the other on financial risk. Each committee must have at least five members, three of whom are board members. At least one of the board members must be independent; the other members are the chief executive officer (CEO) and the chief risk officer (CRO). The CRO heads an independent and central risk management unit, the Unidad de Administración Integral de Riesgo (UAIR), which addresses both operational and financial risks and reports to the board, the CEO, and the supervisor. The regulation specifies in detail the duties and obligations of the CRO, including the interactions with other key executives such as the chief investment officer (CIO). The regulation also requires the presence of a compliance officer to ensure observance of all the regulations.

It is difficult to make a comparison of the effectiveness of these two approaches, because Australian, Danish, and Dutch supervisors may also induce institutions to adopt sound risk management practices through their risk-scoring models. As explained in more detail below, risk-scoring models measure the exposure of institutions to risk and their capacity to manage these risks. This capacity is assessed in some...
<table>
<thead>
<tr>
<th>Country</th>
<th>Risk management plan/strategy</th>
<th>Board committees for risk management</th>
<th>Minimum participation in board committees</th>
<th>Centralized risk management function</th>
<th>Reporting obligations of chief risk officer (CRO)</th>
<th>Relationship of CRO with other functions</th>
<th>Compliance officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>Required to be included in the business plan submitted at time of licensing</td>
<td>Accountability body that inter alia reviews long term risk management</td>
<td>No specific requirements</td>
<td>Must be independent of all other departments in the pension fund</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
</tr>
<tr>
<td>Denmark</td>
<td>Board of directors required to issue risk management guidelines</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
</tr>
<tr>
<td>Australia</td>
<td>Required for licensing; Complexity and detail depend on fund's size</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
<td>No specific requirements</td>
</tr>
<tr>
<td>Mexico</td>
<td>Written policies and procedures for addressing operational and financial risk</td>
<td>Two board committees for operational and financial risks</td>
<td>Board committees must have at least 5 members: three board members, of which one independent, the CEO, and the CRO</td>
<td>Central risk management unit (UAIR) dealing with operational and financial risks and headed by chief risk officer (CRO)</td>
<td>To CEO, Board, and supervisor</td>
<td>Specified in detail</td>
<td>Compliance officer required</td>
</tr>
</tbody>
</table>

**Source:** Authors.
detail, entailing the assessment of the quality of very specific elements of risk management, procedures, and control. Institutions that receive low scores are typically subject to more intensive supervision and are pressed to remedy their deficiencies.

The APRA introduced a guidance note on risk management to further explain the risk management requirements inserted into the legislation in the context of a comprehensive re-licensing program that has resulted in a sharp reduction in the number of institutions. Its supervisors report that several institutions could not demonstrate their capacity to prepare or implement a coherent risk management plan during the re-licensing process.

The Australian experience suggests that pension supervisors probably need to consider a combination of tools to ensure the introduction of sound risk management practices in all institutions, while also providing the necessary flexibility for institutions of different sizes. The Mexican approach can only be implemented in systems with fewer and larger pension funds. The Mexican approach merits consideration by countries with similar systems, although its effectiveness would need to be assessed in the coming years. One of the issues to be examined is whether the approach works well across different institutions, including institutions that are part of financial conglomerates owned by parent companies abroad—a very common situation in systems like the Chilean and the Mexican.

**Risk-Based Solvency Standards**

The main elements of the solvency requirements for the four countries are summarized in table 1.6. The Netherlands has developed the most structured and formal of these solvency regimes. This system originated with a set of solvency standards first developed in 1997 and subsequently refined and introduced with the new pensions act that became effective January 1, 2007. The Dutch system includes a minimum solvency margin and solvency buffers designed to minimize the risk of underfunding due to longevity improvements or fluctuations in interest rates and asset prices.

Liabilities (technical provisions) are measured with a mortality table that reflects predicted longevity improvements and a buffer to deal with unforeseen improvements. The discount rate used is the market yield curve measured by the euro swap curve. The interest rates used for discounting are only slightly higher than those in government bonds of equivalent duration, due to the high credit standing of banks operating in the market and the high market liquidity. All pension funds must
<table>
<thead>
<tr>
<th>Country</th>
<th>Treatment of longevity risk</th>
<th>Discount factors</th>
<th>Minimum solvency requirements</th>
<th>Solvency buffers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>Group specific mortality table adjusted for predicted longevity improvements, plus buffer to address uncertainty in predicted values</td>
<td>Market yield curve measured by euro swap curve</td>
<td>5% of technical provisions (from EU IORP Directive) Measured once per year using current market values Maximum period for correction of deviations: 3 years</td>
<td>Maximum probability of underfunding within one year measured with stress test: 2.5% Solvency buffers determined by risk factors specific to each asset class. Example of risk factors include yearly decline in: Equity: 25–35% (depends on type) Currency: 20% Real estate: 15% Maximum period for correction of deviations: 15 years</td>
</tr>
<tr>
<td>Denmark</td>
<td>Fund-specific mortality table approved by actuary and supervisor Traffic-light stress test includes assessment of the impact of a 5% improvement in longevity</td>
<td>Market yield curve measured by euro swap curve</td>
<td>Solvency margin defined by EU Life Directive: 4% of Technical Provision plus 0.3 % of risk bearing investments Measured every 6 months using current market values Period of correction from minimum required standards: one year</td>
<td>Traffic-light system is a stress test rather than part of the formal solvency rule, but results are taken into consideration in the supervisory assessment. Test defines three zones: green, yellow, and red</td>
</tr>
</tbody>
</table>
Final outcome depends on whether entity remains solvent after test.
Example (yearly variations):
Listed equity:
Red 12%, Yellow 30%
Interest rate (medium duration)
Red ± 0.85%; Yellow ± 1.2%

<table>
<thead>
<tr>
<th>Country</th>
<th>Formal liabilities in DC plans (Yearly variations)</th>
<th>No solvency requirements for DC plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>No formal liabilities in DC plans</td>
<td>No solvency requirements for DC plans</td>
</tr>
<tr>
<td>Mexico</td>
<td>No formal liabilities in DC plans</td>
<td>No formal solvency requirements, but value at risk (VaR) limit designed to limit downside risk for DC members. Historic VaR calculated with rolling 550 day sample at 5% significance with different limits imposed on the two portfolios. Price vector provided by two independent vendors. Higher-risk portfolio: 1% maximum daily loss. Standard risk portfolio: 0.6% maximum daily loss.</td>
</tr>
</tbody>
</table>

Source: Authors.
Note: 1/TP = Technical Provisions.
comply with a minimum solvency requirement equivalent to 5 percent of technical provisions. However, funds must also build additional solvency buffers whose magnitude depends on the degree of asset-liability mismatches and that are designed to reduce the probability of underfunding to only 2.5 percent within a one-year horizon. For example, funds that invest more in equity, or fixed income assets with shorter duration than the duration of liabilities, or foreign currency assets must maintain stronger buffers.

In line with the approach followed in Basel II, pension funds may opt to comply with a standardized model or build their own internal models to compute their solvency requirements, although these models need to be approved by the supervisor. In the standardized model, the solvency buffers are calculated through a stress test based on six broad risk factors and a formula for aggregate risk that takes partially into account correlations across asset classes. The methodology implies that the typical Dutch fund will need to maintain a sizable buffer amounting to 30 percent of technical provisions. To reduce the buffer, the fund will need to reduce the mismatch by, for example, shifting from equity to bonds or increasing the duration of the bond portfolio.

The Dutch approach provides an incentive for pension funds to build their own internal models, because a more refined methodology and more accurate parameters will probably reduce the size of the required solvency buffer. However, if pension funds decide to build their own models this may prove challenging to the supervisor, who will have to assess each of these models.9

Although pension funds may be able to reduce their solvency requirements by building their own models, the Dutch risk-based solvency rule has still been criticized for being too costly and not taking into consideration the possibility that long-run risks are lower due to lower correlations of asset classes over time or mean reversion of equity returns.10 Dutch regulators clearly preferred to adopt a conservative view, while introducing an element of flexibility by allowing a relatively long period of 15 years for compliance.

The Danish solvency requirements are slightly less specified but grounded on the same principles. As with the Netherlands, there is a minimum solvency margin based on the current valuation of liabilities that is supplemented by a stress test based on the composition of assets. The stress test places each fund into one of three traffic-light zones that indicate the current solvency position. It is distinguished from the Dutch approach because it does not explicitly link remedial measures to the
status of the funds; rather, it seeks to maintain funds within a solvency corridor through signaling devices and market pressures. A solvency status is calculated for every institution twice a year and places each institution in one of three categories: a green light for those within acceptable solvency status, a yellow light for those in danger of facing solvency problems, and a red light for those that face severe and immediate problems.

Rather than impose a single potential scenario of adverse market conditions, the Danish approach establishes two sets of parameters for each risk factor, which effectively imply a mild and a strong stress test. If a fund is put into theoretical insolvency by the mild test, it is deemed to be in the red zone. In other words, funds in the red zone cannot withstand even a moderate adverse shift in asset prices. Those that remain theoretically solvent under the mild test but not the strong test are placed in the yellow zone. For example, a decline in equities of 12 percent is posited for the red test, and 30 percent for the yellow. The factors are 8 percent and 12 percent, respectively, for real estate. Factors are also stipulated for varying duration of fixed-income instruments, credit risk, and others. Funds that remain theoretically solvent after the strong test are put in the green zone.

Failure to meet the yellow scenario is treated as an early warning indicator. An institution that receives a yellow light is placed under intensified supervision. The primary goal of intensified supervision is to increase the risk awareness of the management of the pension institution. When an institution receives a red light, it may be subjected to more drastic intervention. The supervisor may order the institution concerned to take the measures necessary within a specified time limit if its financial position has deteriorated to such a degree that it puts the interests of policy holders and other affected parties at risk.

A red light does not necessary imply that the institution will immediately be subject to crisis management. The supervisor will normally require monthly reporting from the institution as well as a commitment that it will not increase its overall risk exposure. If the institution remains in a red light situation for a prolonged period a reduction in risk will be required, although measures to reduce risks and/or risk exposures are not specified in detail. However, action plans prepared by the institution concerned must be submitted to the supervisor. The Danish Financial Supervisory Authority (DFSA) decides the maximum period for the restoration of the financial position, depending on the size of the shortfall and anticipated market developments. The DFSA is expected to monitor the performance of the operating plan and demand changes
in the plan if the financial position of the institution suffers further deterioration. If the base capital of the pension institution is less than one-third of the solvency requirement or is less than the minimum capital requirement, the period for restoration of capital will be stated in months and will not normally exceed one year.

Australia, which has rapidly transitioned to nearly an entirely DC-based system over the past decade, does not incorporate explicit solvency requirements on the risks of DC fund portfolios. However, the exposure to financial risks is captured in the risk-scoring model, and the supervisor will check if the institution has the capacity to manage these risks. If the institution proves to be unable to manage the risks associated with a more aggressive or complex portfolio, it becomes subject to more intensive supervision.

Mexico has taken an entirely different approach to volatility risk. Within the DC system, the relevant characteristic is the volatility of the value of member’s accounts rather than the asset-liability balance. While not, strictly speaking, a solvency measure in the traditional meaning, the parameters that Mexico requires the pension funds to remain within serve a similar purpose: to ensure the adequacy of the asset base and retain its fluctuations within a prescribed level. The parameters set by the VaR may be viewed as implicitly assuming a liability (or minimum return) for the pension system.

The Mexican limitations are established in the form of a maximum permissible VaR that the funds are permitted to have. Mexico now permits two types of portfolios (Siefores) within each of the pension companies (Afores). The standard portfolio established at the outset of the systems design is limited to a composition that is estimated through the methodology outlined below to be associated with a maximum loss in a day of less than 0.6 percent of its value. The higher risk/return portfolio that was recently introduced into the system must maintain a VaR of less than 1.0 percent.

The VaR is calculated by the supervisor on a daily basis, based on a rolling 500-day sample of the prices of all of the permissible assets. The price vector is provided by two independent price vendors to ensure a common valuation methodology and comparability. The VaR is historic and calculated with a 5 percent level of significance for each portfolio (the individual portfolios are reported to the supervisor through automated systems). If any of the funds drifts outside of the permissible limits, the supervisor is able to intervene and provide specific instructions.
regarding the reallocation required to move back within the prescribed standard. This has not occurred yet, as the actual VaRs remain well below the ceilings.

**Supervisory Risk-Scoring Systems**

All supervisors gain an understanding of the risk profile of pension funds through their normal activities. Any basic supervision framework involves the collection of data from pension funds. This can be as basic as the collection of annual accounts; more typically it involves collection of data through a set of standard forms designed by the supervisor and submitted by the pension funds on a regular basis. Through the analysis of collected data supervisors will have a picture of the financial strength of the funds that can be supplemented by the collection of additional information from onsite inspections and the market. This information can be combined for the computation of overall risk scores for each institution. The various risk-scoring systems from the four countries reviewed are shown in table 1.7.

Australia was the first of the four countries to introduce a fully developed scoring system with the introduction in 2002 of a structured framework for risk assessment in pension funds known as the Probability and Impact Rating System (PAIRS). The results of this structured methodology for ranking pension funds according to the relative threat of failure are then mapped into a supervisory response framework, the Supervisory Oversight and Response System (SOARS). The model makes a distinction between larger funds subject to detailed assessment and smaller funds subject to a streamlined and more automated assessment. Additional focus is also given to DB funds.

APRA applies the same broad supervisory model to superannuation funds as to banks and insurance companies. The analyst is asked to assess the significance of the risks and mitigating factors and the extent to which each contributes to (for the inherent risk factors) or reduces (for the management and control areas) the overall risks of the fund. Weighted numerical assessments are combined into an overall score. This score is converted to a risk rating using a nonlinear function to ensure that higher risk funds are given greater attention. After taking into account an impact rating based on fund size, the scores are converted into a supervisory attention index that maps into a supervisory stance and action plan. In this way the rating directly defines how the supervisor will manage the relationship with the pension fund. Funds in the normal
<table>
<thead>
<tr>
<th>Type of risk-scoring system</th>
<th>Aims of the model</th>
<th>Main elements of risk-scoring system</th>
<th>Special features for pensions</th>
<th>Supervisory response framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands (FIRM)</td>
<td>Comprehensive risk-scoring model applied to all types of institutions covered by integrated supervision authority</td>
<td>Identify and measure all major risks and the capacity of the entity to manage them; Determine supervisory response; Induce buildup of internal risk management capacity</td>
<td>Definition of gross or inherent risks, as well as mitigating factors through risk controls; Use of default scores and templates; Combined probability and impact. Single net risk score built up from common elements</td>
<td>Risk-based solvency standards (FTK) applied to pensions and insurance provides major inputs to the risk scoring model and is a supervisory tool on its own</td>
</tr>
<tr>
<td>Denmark</td>
<td>Set of early warning indicators, including the results of the traffic-light stress test</td>
<td>Identify areas and institutions exposed to greater risks; Determine supervisory response; Induce buildup of internal risk management capacity</td>
<td>Risk-scoring model is partly developed; Relies relatively more on the results of the traffic-light stress test</td>
<td>Traffic light is a stress test that complements the EU solvency margin requirements</td>
</tr>
<tr>
<td>Country</td>
<td>Description</td>
<td>Source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>Comprehensive risk-scoring model applied to all types of institutions covered by integrated supervision authority</td>
<td>Authors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify and measure all major risks and the capacity of the entity to manage them; Determine supervisory response; Induce build-up of internal risk management capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Definition of gross or inherent risks, as well as mitigating factors through risk controls. Use of default scores and templates. Combined probability and impact. Single net risk score built up from common elements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capital strength component excluded for DC funds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Risk-scoring maps directly to supervisory response (SOARS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>Set of early warning indicators; Developing a risk scoring model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Under development; Actual VaRs will be input to the model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VaR limit computed daily.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If breach of VaR results in a loss, compensation must be paid.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Authors.
category are subject to regular supervision activities. Those in the oversight category receive more intense monitoring and more frequent contact. Funds rated for mandated improvement are expected to develop and implement plans for improvement, while those rated restructure require strong enforcement action. The framework imposes a stronger analytical discipline to a still largely judgmental process and provides an audit trail to analyze and explain supervisory decisions and actions. It allows APRA to allocate more resources to institutions whose failure would have a greater impact on the financial system.

In the Netherlands in 2005, the DNB introduced an integrated method for analyzing risk for all financial institutions—FIRM—that replaced the earlier pension and insurance specific system known as the Model for the Analysis of Risk (MARS). Like Australia, supervision in the Netherlands is based on the ongoing process of information collection, consultations with the supervised entities, and a structured approach to the assessment of risk and the manner in which those risks are managed. Under the FIRM model, the DNB takes into account the assessment of solvency outlined earlier and combines this with an evaluation of the pension entity, the risks to which it is exposed, and the quality of the risk management procedures in place. Like Australia, the results of the risk assessment become the basis for decisions regarding the nature and intensity of supervisory action.

The FIRM model adopts a four-stage approach to building the risk assessment. The first step constructs a detailed profile of the pension fund. The second step identifies relevant management units and functions and assigns weights to these. Using this functional breakdown, the third step evaluates gross risks and assigns a score to this assessment. In contrast to Australia, the Dutch system combines probability and impact into a single score within the system rather than assessing these separately, based on the view that the two elements are so closely related they should not be independently considered. The various types of risks identified in Australia and the Netherlands are similar. The additional focus in the Netherlands on technical insurance and mismatch risks reflects the primarily DB nature of the pension system.

The fourth step in the Netherlands seeks to obtain an insight into the quality of risk controls for each risk category to derive a final value that represent the net risks of the pension fund. The aggregation of risks is based on a mathematical algorithm that puts emphasis on high risks and poor controls. The reports that form part of the FIRM model form a basis for the planning of supervision activities. The frequency of onsite
inspections is determined largely by the risk profile of the fund. During an onsite inspection data are collected that allow the FIRM model to be updated; high-risk areas that have been identified are examined closely.

Concurrent with the introduction of the VaR standards in 2002, the Mexican supervisory authority CONSAR has developed elements of a risk-scoring model in the form of early warning indicators for assessing operational and financial risks. The current methodology entails three risk factors—low, medium, and high—and gives emphasis to irregularities detected during supervision activity. Reflecting the fact that Mexico operates a DC system, it is not surprising that the main identified weaknesses relate to internal controls and the collection of contributions. Supervision strategies are focused on the most critical areas identified by the early warning system. However, CONSAR is in the process of incorporating other elements of risk into the VaR, such as credit risk, and assessing how it can make greater use of the VaR results for risk scoring.

Denmark has also developed elements of a risk-scoring model, in the form of an internal rating system with three internal quality scores covering organization, procedures, and internal controls, as well as ratings on insurance risks that mainly cover longevity risk exposure of the different institutions. The DFSA combines these internal scores or early warning indicators with the traffic-light results to guide the intensity and scope of supervisory activity.

**Market-Based Discipline and Third Parties**

The importance of market discipline in RBS depends fundamentally on the type of pension system and the extent to which supervisors ensure disclosure and enhance the roles of third parties, such as the external auditor. In general, the market discipline pillar is more relevant in open pension systems that allow selection of the provider. Even in these cases, however, the supervisor must ensure proper accounting, auditing, and disclosure rules ensuring the access of fund members and market analysis to relevant and accurate information.

As shown in table 1.8, all the four countries have adopted market valuation of balance sheets. While this is a standard feature of DC systems, such as the Australian and the Mexican, it has only recently been introduced in the Netherlands and Denmark. In all the countries external auditors need to verify the accuracy of financial statements; in Australia and Mexico their role is expanded to include an assessment of the quality of risk management systems. In each of the four
countries external auditors have whistle-blowing obligations that require them to report material problems to the supervisor.

Mexico imposes extensive disclosure requirements, including monthly disclosure of individual portfolios, returns, fees, and VaRs. Denmark discloses annually a large number of performance and solvency indicators of individual providers, allowing for direct comparisons of performance. The Australian Securities and Investments Commission has detailed product
Disclosure requirements for funds that allow members to direct their investment strategies. However, disclosure requirements on fund performance remain comparatively less extensive in Australia, a somewhat surprising result considering that members have been recently allowed to switch across pension funds. The less-demanding disclosure requirements in the Netherlands reflect the closed nature of the Dutch system.

Overall, the market discipline pillar seems to play a more important role in Mexico and Denmark, followed by Australia and the Netherlands. Mexico would seem to meet all the requirements for a strong third pillar, although the benefit guarantee extended to older workers probably weakens market discipline (Berstein and Chumacero 2006a). The Danish system also assigns an important role for the third pillar, as indicated by the comprehensive disclosure requirements.

Australia has recently extended the scope of external audits to include an assessment of the quality of risk management systems. The extent to which external auditors can perform this task effectively is open to question, but the fact that regulations include this obligation reveals the intention to increase the importance of third-party monitoring. Moreover, the recent decision to allow members to switch funds may increase pressure for more disclosure in the future. In the Netherlands, disclosure requirements are less extensive, although the obligation for single sponsors to reflect the situation of their funds in their balance sheets may introduce an important element of market discipline.

**Internal Structure of the Supervision Agency**

The supervisory agencies of the four countries include one responsible solely for supervising retirement savings (Mexico), two independent integrated supervisors (Australia and Denmark), and one in which the central bank serves as an integrated financial supervisory authority (the Netherlands).

In Mexico, CONSAR was initially focused on collecting information and ensuring compliance with the rules and regulations, particularly the tight controls over investment. In the past few years it has undergone an internal reorganization to allow it to implement more effectively a risk-based approach to supervision. The main supervision activities have been separated into operational and financial areas under two separate vice presidencies. CONSAR has been building up its technical capabilities to assess the impact of VaR models and enable assessment of the risk management practices among the pension fund managers.
The DFSA was established in its present form as an integrated financial sector regulator in 1988. Major segments of the financial industry are supervised in different divisions. The life and pensions division is one of 10 divisions responsible for supervision and regulatory techniques. Staff members in this division take part in offsite surveillance and onsite inspections. This division was responsible for developing the traffic light stress test, in close collaboration with the banking division that had developed expertise in this area.

Within the DNB, supervision is organized around several operating directorates aligned with particular types of institution such as conglomerates, banks, insurance companies, and pension funds. Each division is supported by a supervisory policy division with responsibilities across all types of institutions and by centers of expertise in specialist areas such as asset-liability management. The development of FIRM has involved representatives from all supervisory divisions but is “owned” by a division director from one of the supervisory divisions. An expert team comprising representatives from all operational divisions is responsible for ensuring that the system is updated as required.

Within APRA, supervision follows a more integrated model in which staff members may have responsibility for several types of financial institutions. In their supervisory and analytical work analysts responsible for routine supervision are supported by specialists in credit, market, and operational risks and can draw on actuarial support. A separate group within the policy and research division provides technical support for the PAIRS/SOARS model and collects data on risk rating for regular reporting to management and the executive team within APRA.

**Preliminary Assessment of the Impact of Risk-Based Supervision**

Some initial observations can be gleaned from the limited information available about the changes associated with the adoption of RBS. It is important to stress that any assessment must be seen as preliminary, because these new supervisory systems have been introduced very recently and are designed to control pension systems whose outcomes in relation to the ability to deliver retirement benefits for a typical member extend across many decades.

**The Netherlands**

The new Dutch supervisory paradigm is primarily directed to the resiliency of the solvency of DB pension plans. Although not formally
imposed until very recently, both the FIRM scoring system and the solvency standards had similar antecedents in prior systems that were either announced or put into practice over the past four to five years, a period likely to be sufficient for underlying effects to begin to come to light. These risk-based approaches potentially impose significant costs, especially the new risk-based solvency rules. These new rules may induce funds to change their strategic asset allocation, increase contribution rates, reduce benefits, or implement a combination of all these solutions. They may also induce employers to stop sponsoring DB plans altogether and move toward less-onerous DC plans.

In other countries such as the United Kingdom and the United States, increasing risks to plan sponsors have resulted in a massive substitution of DC arrangements and some decline in coverage; however, neither of these results is observed in the Netherlands. The overall coverage rate remains above 90 percent, one of the highest in the world, and the total number of members has remained essentially unchanged since 2004. Virtually all of these remain DB plans, with DC plan coverage showing an increase from 2.3 to 3.6 percent of members between 2004 and 2006. This seeming resiliency of the DB system to regulatory encroachment must be considered in the context of a system founded in collectively bargained industry-wide arrangements that, at a minimum, are likely to be insulated from changes in form over the short term. The only possible effect that can be observed in the aggregate data is a decline in the number of funds from over 1,000 in the late 1990s to 860 in 2004 and 798 in 2006. This reduction may reflect the higher costs imposed by the new system that make small funds less viable, but it may reflect other causes as well. In any case, another five years may be required to conclusively observe any effects of the new rules on coverage, plan selection, and fund size.

What has happened more clearly in recent years are dramatic changes in the secondary aspects of pension scheme characteristics. While many of these are most likely related to broader pressures of population aging, to some extent the changes may be interpreted partially as a process of hedging risk exposure in response to the new, more-stringent solvency measures. The proportion of Dutch pension funds that provide benefits based on final pay has declined from 54 percent in 2002 just prior to the initial introduction of risk-based rules to about 10 percent. A less-marked increase in the incidence of conditional indexing of promised benefits to price levels has occurred from 90 percent in 2002 to an almost universal 98 percent in 2006, although this indicator had very little room for movement.
Another area to observe the impact of the new supervisory system is the investment patterns of funds. Two effects were generally posited in response to rules that impose high costs for asset-liability mismatches. These are a movement away from equities to fixed income and increases in the duration of fixed-income portfolios. The aggregate balance sheet information on pension funds does not appear to support the first of these expectations (table 1.9). The available evidence does however seem to indicate the second expected impact—the lengthening of the duration of the fixed-income portfolios to better manage the mismatch exposure that is exacerbated with the volatility of the new market-based discount rate. From the end of 2003 to the end of 2005 average duration increased by a year to more than six years, with some funds moving to much longer durations (figure 1.2).

It is possible that pension portfolios will become more conservative in the future, as pension funds build their internal models and reassess in more detail the impact of the new rules on their solvency position. At the same time, the absence of more pronounced shifts in strategic asset allocation could also be due to the long period of compliance. Pension funds are allowed 15 years to address shortfalls in the required solvency buffers. This relatively long period of compliance introduces a necessary element of flexibility, especially in view of the uncertainty regarding mean reversion of equity returns.

**Denmark**

The introduction of the risk-based approach to supervision occurred just prior to the decline of interest rates and the drop in equity prices in

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**Table 1.9. Asset Allocation of Dutch Pension Funds, 2001–05**

*(in % of total)*

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land and buildings</td>
<td>11%</td>
<td>11%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Investments, nonconsolidated</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Shares and other variable-yield securities</td>
<td>42%</td>
<td>35%</td>
<td>40%</td>
<td>40%</td>
<td>42%</td>
</tr>
<tr>
<td>Bonds and other fixed-yield securities</td>
<td>36%</td>
<td>41%</td>
<td>39%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Mortgage loans</td>
<td>3%</td>
<td>4%</td>
<td>3%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Private loans</td>
<td>5%</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Deposits</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Other investments</td>
<td>2%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Liquid assets</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Total (euro millions)</td>
<td>460,777</td>
<td>427,297</td>
<td>481,811</td>
<td>542,112</td>
<td>624,881</td>
</tr>
</tbody>
</table>

*Source:* DNB (various years) and authors’ calculations.
2001–02, making it difficult to distinguish the effects of the introduction of the new system from external factors. Immediately after the introduction of the more risk-oriented rules, pension institutions suffered huge losses on their equity portfolios, while the present value of technical provisions increased dramatically. A very high proportion of contracts had been issued with guaranteed returns. Guaranteed rates were lowered by two-thirds in two stages over the 1990s, but pension institutions continued to be exposed to the residual high-rate contracts for both past and future contributions that could still be made under the terms of the previous contracts.

The mismatch between assets and liabilities was aggravated by the presence of large investments in mortgage bonds with embedded call options. As borrowers exercised their option to refinance their mortgages with lower interest rates, pension institutions did not experience an increase in the market value of their bond holdings. In this situation, a large number of institutions found themselves in the yellow light zone under the new traffic light system, while some were even in the red light zone. For a few companies the situation turned out to be so severe that they encountered real problems in fulfilling their solvency requirements and were placed under special supervision by the authorities.

As shown in table 1.10 and figure 1.3, pension institutions reacted to the financial crisis and the new stress testing by reducing the proportion of equities following two years of substantially negative returns in 2001.
and 2002. They also began to close the duration gap that had led to the deterioration of their solvency position by increasing investment in foreign bonds, which offer longer durations. The institutions also began to engage in extensive hedging operations, mostly through the use of long-term interest rate swaps in the more liquid euro market. Although such policies ran the risk of locking in the losses, it was generally accepted that under the new solvency standards pension institutions could not afford to suffer additional losses and further endanger their position.

The increased use of derivatives and the changes in strategic asset allocation significantly improved the position of pension funds in relation to unfavorable interest rate movements, as indicated in the simulations.

Table 1.10. Changes in the Asset Allocation of Life Companies and Pension Funds, in %

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic bonds</th>
<th>Foreign bonds</th>
<th>Domestic equities</th>
<th>Foreign equities</th>
<th>Investment trusts</th>
<th>Other assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>54.4</td>
<td>1.3</td>
<td>13.4</td>
<td>12.3</td>
<td>1.9</td>
<td>16.7</td>
</tr>
<tr>
<td>1999</td>
<td>46.6</td>
<td>2.1</td>
<td>12.6</td>
<td>18.3</td>
<td>3.5</td>
<td>17.0</td>
</tr>
<tr>
<td>2000</td>
<td>44.7</td>
<td>4.8</td>
<td>11.3</td>
<td>18.5</td>
<td>4.6</td>
<td>16.1</td>
</tr>
<tr>
<td>2001</td>
<td>45.1</td>
<td>10.7</td>
<td>8.6</td>
<td>12.5</td>
<td>6.3</td>
<td>16.8</td>
</tr>
<tr>
<td>2002</td>
<td>53.0</td>
<td>13.6</td>
<td>4.6</td>
<td>6.9</td>
<td>6.2</td>
<td>15.7</td>
</tr>
<tr>
<td>2003</td>
<td>51.3</td>
<td>12.4</td>
<td>4.4</td>
<td>8.0</td>
<td>8.1</td>
<td>15.8</td>
</tr>
<tr>
<td>2004</td>
<td>43.2</td>
<td>14.6</td>
<td>4.6</td>
<td>8.3</td>
<td>12.3</td>
<td>17.1</td>
</tr>
</tbody>
</table>

Source: DFSA and Danish Insurance Association.

Figure 1.3. Asset Composition in Danish Pension Companies, 1999–2004

Source: DFSA and Danish Insurance Association.
shown in Table 1.11. While in 2001 and 2002, an interest rate fall of one percentage point produced a net loss of more than DKK 15 billion (US$3 billion), the new portfolio structure had transformed a negative 100 basis point decline into an estimated net gain of DKK 15 billion (US$3 billion) in 2003 and DKK 8 billion (US$1.6 billion) in 2004.

In addition to these changes in asset allocation were other important changes in the rules for profit distribution; the Danish system is dominated by risk-sharing or profit-sharing policies. Until recently, most institutions set the rate of profit distribution to clients one year ahead. This rate was an important competitive parameter among pension institutions. However, after 2002 many institutions introduced a variable rate of profit distribution that depends on investment performance during the year. This more flexible approach made it easier for institutions to meet their obligations; however, coupled with the substantial reduction in guaranteed rates of return it created considerable uncertainty in the eyes of policy holders.

Overall, the introduction of RBS in Denmark has led institutions to reduce their asset-liability mismatches through changes in asset allocation and greater use of derivatives. One important consequence of these adjustments has been the decline in the expected rate of return on the portfolio and the decreased enthusiasm of providers to offer benefit guarantees. The greater use of derivatives has apparently helped companies reduce asset-liability mismatches at a reasonable cost but does not seem to have been able to arrest a decline in the expected rate of return. Interestingly, new clients have been more willing to take more risk in exchange for a higher expected return, as indicated by the growth of unit-linked and other products that are offered without any guarantees or with reduced levels of guarantee. Therefore, the Danish system seems to be moving toward a more traditional DC system with fewer guarantees.

These trends seem to contradict the conclusion of other researchers that the use of derivatives (especially long-term interest swaps) has

<table>
<thead>
<tr>
<th>Year</th>
<th>Change</th>
<th>Liabilities DKK bn</th>
<th>Assets DKK bn</th>
<th>AL gains DKK bn</th>
<th>Derivatives DKK bn</th>
<th>Net gains DKK bn</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>–1%</td>
<td>–65.0</td>
<td>49.4</td>
<td>–15.6</td>
<td></td>
<td>–15.6</td>
</tr>
<tr>
<td>2002</td>
<td>–1%</td>
<td>–66.6</td>
<td>26.7</td>
<td>–39.9</td>
<td>25.1</td>
<td>–14.8</td>
</tr>
<tr>
<td>2003</td>
<td>–1%</td>
<td>–52.0</td>
<td>40.2</td>
<td>–11.8</td>
<td>26.9</td>
<td>15.1</td>
</tr>
<tr>
<td>2004</td>
<td>–1%</td>
<td>–76.1</td>
<td>40.7</td>
<td>–35.4</td>
<td>43.8</td>
<td>8.4</td>
</tr>
</tbody>
</table>

Source: Ladekarl and others 2007.
allowed Danish companies to address the mismatches and also preserve returns (Boeri and others 2006). On the contrary, the available evidence suggests that the new risk-based rules have induced pension funds to hold more conservative portfolios and lower guarantees, and that young members are favoring contracts that entail higher expected returns and more volatility. This is an area that should merit more research, as it would throw more light on the impact of RBS on portfolio strategies.

**Australia**

Two main elements to changes in the RBS framework in Australia have had an impact on superannuation (pension) funds over the past few years: the introduction of the PAIRS/SOARS framework and a comprehensive licensing framework for all superannuation funds.

The PAIRS/SOARS framework was intended to improve APRA’s supervisory performance and not directly impact on the industry. APRA assesses the timeliness and effectiveness of its intervention by tracking the migration of institutions among the different supervisory stances. In the three years since the model was introduced the great majority of institutions in mandated improvement or restructure at some point over this period have either improved or exited the industry, with no entity failures. Of the 168 institutions that have been in these two stances, 57 have improved, 16 remain in their SOARS category, 1 has been downgraded, and 94 have exited (APRA 2006). APRA does not separately publish these data for superannuation funds but has confirmed that approximately 100 have been superannuation funds. These figures suggest that these tools have made APRA more effective, but they have mainly helped industry by removing or strengthening the weakest entities.

The second major change has been the introduction of superannuation licensing. At the beginning of the licensing transition period there were more than 1,700 trustees operating. By the end of the licensing transition period 307 trustee licenses had been issued, with about twice as many registered funds. This consolidation had begun many years before APRA introduced licensing, but this measure clearly hastened industry consolidation and generated a move toward corporate superannuation outsourcing. In order to be granted a license trustees had to demonstrate that they meet the required minimum standards of risk and were well placed to provide beneficiaries with greater levels of safety and security for their superannuation accounts. New operating standards concerning fitness and propriety, risk management, adequacy of resources,
and outsourcing proved challenging to meet and many trustees have left the industry.

One of the reasons for reform of superannuation was to create a more professional industry where risk management standards, particularly for operational risk, were substantially improved. In its most recent annual report APRA notes that a regulated superannuation fund (excluding small funds) now manages, on average, over seven times the level of assets it managed five years ago, a period in which total superannuation assets have less than doubled. Superannuation funds have grown in terms of size, complexity, and sophistication of risk management, and the industry more closely resembles other industries that APRA regulates.

Among those trustees that have exited have been some generally smaller entities with problematic investments involving highly undiversified portfolios (sometimes dominated by a handful of illiquid assets) and related party and employer-linked transactions. However there has been little impact on broader investment strategies or any observable changes in the investment composition of the industry.

APRA suggests that the implementation of PAIRS/SOARS has resulted in more consistent supervisory outcomes by allowing for a better calibration of APRA’s reaction to supervisory issues across a large number of institutions and supervisors. The primary source of information for a PAIRS assessment is based on the findings from supervision activities. Any requirements placed on superannuation funds and recommendations for changes in behavior or systems generally arise from these finding rather than from a particular PAIRS rating. However, while PAIRS does not mandate those changes on an institution per se, it is very useful in calibrating the impact of these changes on the overall risk profile of a fund. Industry has indicated that improved consistency enhances its confidence in APRA’s methods and procedures.

**Mexico**

The search for efficiency gains and the concern with extreme portfolio losses were two important factors that motivated the adoption of RBS in Mexico. The combination of relaxed portfolio restrictions (including the permission to use derivatives) and stricter risk management requirements was intended to lead to more efficient outcomes, while the VaR limit would contain the exposure of individuals to downside risk.

The impact of the regulatory changes is assessed by examining the resulting shifts in the efficient frontier and the actual changes in portfolio strategies. CONSAR provides estimates of the efficient frontier for
every year when the investment regime was liberalized. These estimates indicate that the frontier has been expanded quite substantially, especially in 2004 when there was another round of changes combined with the introduction of the VaR ceiling. Figure 1.4 illustrates the shift in the frontier resulting from the latest round of changes. The expansion of the frontier resulting from a relaxation of portfolio controls is expected and consistent with estimates for other countries, such as Chile (Berstein and Chumacero 2006b). However, whether the expansion of the frontier has led to more efficient outcomes is a more complex question.

It is clear that pension fund managers have made use of the greater freedom by moving away from very basic portfolios and investing more in domestic and foreign equity, as well as foreign fixed-income instruments. As shown in table 1.12, the share of public sector bonds has declined from almost 100 percent to 75 percent, and the share of higher yield, privately issued domestic and foreign assets, has increased commensurately. The average maturity and duration of the fixed-income portfolio has also increased significantly, as shown in figure 1.4. These portfolio shifts are reflected in risk-return combinations that are higher and to the right (figure 1.5). The portfolio shifts are also reflected in the increasing VaRs, although VaRs remain well below the ceiling (figure 1.6).

**Figure 1.4. Maturity of the Public Debt Stock and Government Securities in the Riskier Portfolio**

![Maturity of the Public Debt Stock and Government Securities in the Riskier Portfolio](source: CONSAR)
The outcomes are positive overall, as there has been a diversification away from a very basic and low return portfolio consisting primarily of government securities with short durations. However, there is no evidence of gains in the risk-return trade-off, strictly defined as a decrease in risk for the same return or an increase in return for the same levels of risk. This is not surprising, as pension funds were basically investing in the risk-free portfolio. The right and upward movements in risk-return combinations
and the increase in VaRs must be interpreted in this context. Even after these initial shifts, portfolios remain undiversified relative to pension funds in other countries and VaRs remain well below the ceiling. All in all, the conclusion is that the new approach has produced positive outcomes, but these can not be interpreted as an efficiency gain in the strict sense. It is simply too early to make an assessment of whether the new approach is able to produce more efficient outcomes, relative to a regulatory regime that relies more heavily on portfolio controls, or relative to a regime like the Australian that does not impose VaR ceilings and that emphasizes sound risk management without imposing prescriptive regulations.

A critical question in Mexico is how portfolio managers will build their strategies once the actual VaRs approach the limits. Mexican supervisors have the power to increase the VaR limits if they conclude that the current ones excessively limit pension fund managers. However, a more fundamental question is whether VaR limits are the best approach for influencing the investment policies of DC pension funds and achieving efficient outcomes in the long run. The application of VaRs for pension funds remains controversial; there are well-known arguments against the adoption of a short-run risk measure for institutional investors that should operate with a long-time horizon.\textsuperscript{13} Whereas the Mexican approach...
is innovative and attractive in many aspects, including the objective of containing downside risk, assessing its effectiveness will require a longer period and comparisons with the outcomes generated by other approaches to RBS of DC plans, such as those in Australia.

**Concluding Observations**

Review of the four early adopters of RBS for pension systems illustrates the potential for the application of these principles and methods across the full range of pension system designs. The nearly exclusively DB system operated by not-for-profit institutions in the Netherlands, the traditional DC employer-sponsored funds in Australia, commercial pension institutions in Mexico, and a hybrid system with guarantees in Denmark all have made progress in introducing risk-based standards and procedures. The experience of these early adopters provides a number of observations and lessons that are useful to consider as other countries begin to move in this direction.

Risk-based supervision as it has emerged for banks and insurance companies is most readily transplanted to DB pension systems such as that of the Netherlands. This is because the types of risk and associated methods that focus on solvency measurement and asset-liability matching are quite similar. The presence of return guarantees such as in Denmark creates some convergence of principles but requires more adaptations.

Application to DC systems such as Australia and Mexico impose the greatest challenges. Transferring investment risk to members requires the formulation of alternative financial risk concepts. Mexico has been innovative in applying the concept of VaR as an attempt to contain downside losses. This remains controversial due to the limited linkages between such a short-term measure and the longer horizon of pensions. This technique may involve tradeoffs between security and optimizing long-term returns. Australia has sidestepped this challenge by simply incorporating process-based investment standards into its broader risk-scoring techniques. However, this is only a viable option in systems grounded in well-established and supervised financial service providers. Development of income replacement targets for which a fund member might aim, and scenarios based on contributions and returns, perhaps offers potential future enhancements to both of these approaches.

The use of comprehensive risk-scoring models appears to offer considerable promise for pension supervision. Moreover, there is a high potential for
establishing generic models applicable to a number of financial institutions, which can provide strong support for the integration of financial institution supervision. A consistent approach to the design of risk-scoring systems has emerged among the various countries that will provide a useful template for others to follow. Scoring systems appear to offer considerable potential for inducing an improvement in the quality of internal risk management as well, although pension supervisors may still need to complement the use of risk-scoring models with direct regulations on risk management. Scoring systems also offer the promise of establishing sophisticated metrics to guide the allocation of supervisory resources and through public disclosure a strong basis to leverage market discipline.

There has been only limited progress to date in utilizing enhanced disclosure and market competition to improve the efficiency and security of pension funds. Although sophisticated risk-scoring and evaluation techniques have been developed in three of the countries and are in the process of being implemented in Mexico, ratings are not disclosed to the market. Denmark remains at the vanguard of this process but limits this to summary solvency indicators rather than the underlying analysis. The Netherlands limits disclosure of risk management scores to the pension funds. Australia does not even disclose to a fund its rating, although funds will notice the changes in supervisory stance that would accompany a rating change. This perhaps reflects a need for a continuing adaptation of the tools derived from banking to the different context of pensions. Indeed, whereas supervisors rarely release a bank’s rating for fear of causing a “run” on weaker institutions, there may be scope for being more open in disclosing ratings for pension funds in order to strengthen market discipline and promote sound risk management.14

Evidence of the impact of risk-based methods is preliminary at best, and it remains far too early to draw any decisive conclusions. There is no indication of loss of pension coverage in any setting and other measurable effects have been largely at the margins. Funding ratios in Denmark and the Netherlands have improved, but this would probably have occurred in any event due to the recovery of the asset markets coincident with the adoption of the new methods. Portfolios in Denmark and the Netherlands have become more conservative and exhibit indications of better duration matching. In both countries pension funds seem to be looking for more flexibility to reduce their solvency requirements. Dutch funds seem to be making greater use of conditional indexation. Danish funds are offering a greater variety of products, and new entrants seem to favor unit-linked products with lower guarantees but offering prospects
of higher returns. This can be interpreted as a movement away from pure DB systems, which is much more pronounced in the Danish case, but no hard data are available for a decisive conclusion.

Some observers remain confident that the use of derivatives will increasingly allow pension institutions in Denmark and the Netherlands to hedge their risks at a reasonable cost without unduly sacrificing returns. However, it is too early to conclude that the new risk-based methods are indeed resulting in lower returns and a move away from DB system and/or guarantees. It is also too early to assess the extent to which derivatives will allow pension funds to hedge their risks without sacrificing returns. In the two countries, the movements in pension portfolios and their implication for long-run return performance will need to be carefully assessed in the next few years.

In Australia the introduction of the risk-scoring model in conjunction with stronger licensing standards has accentuated the ongoing trend away from DB plans and has led to the consolidation of the industry, as smaller funds have increasingly been absorbed by larger entities. However, this is likely due to a broader set of factors with adoption of RBS hard to distinguish. In Mexico it is simply too early to draw any conclusions because the system remains in a formative stage. The early evidence provides promising indications of a more diversified portfolio associated with the relaxation of asset allocation requirements in favor of risk-based measures. The applicability of short-term VaR measures remains controversial, and it is difficult to assess how investment policies will evolve in the longer run, as the actual VaRs approach their ceilings.

A variety of difficult challenges will need to be addressed as these risk-based systems evolve. Both the Dutch and Danish systems implicitely place little reliance on the possibility of mean reversion in equity markets by utilizing fixed parameters in their stress testing. It is possible that solvency buffers will prove excessive and costly. This issue is partially addressed through the 15-year adjustment period for compliance with solvency requirements and the ability of funds in the Netherlands to propose their own stress testing methodology. In Denmark, the fact that the traffic-light system is not a formal solvency requirement also introduces an element of flexibility. It remains to be seen whether the two countries have achieved the right balance between solvency protection and flexibility in the system. Similarly, the capacity of the supervisor to effectively evaluate individual internal solvency models will provide useful lessons for others contemplating similar elements to achieve efficient outcomes through flexibility.
There are related issues in the mechanics of the methods. For practical (and likely political) reasons the solvency standards in use are based on retrospective measures of asset class volatility. This can potentially create price distortions and unduly limit innovation and the emergence of new instruments and may not accurately reflect the nature of some potential investment categories. For practical purposes, the mark-to-market pricing requirements of these standards effectively limit pension funds to assets with observable prices. The tradeoff between gains from the transparency of market discipline arising from such standards will have to be very carefully considered in relation to the longer-term constraint on risk-return efficiency of overall portfolios. This limits pension funds capacity to pursue the illiquidity premiums available in some types of investments such as private equity and private placements, which are often perceived as advantageous to pension funds due to their relatively minimal liquidity requirements.

Three more general challenges are also important in considering the utility of risk based approaches. Most fundamental is the applicability of the risk standards to the inherent nature of pension funds. Thus far these have no direct linkage to a fully articulated concept of retirement income adequacy. There is no empirical basis for the 1 percent daily VaR in Mexico that considers how much return and volatility over the multiple decade investment time horizon of the typical participant is appropriate. The 97.5 percent probability standard in the Dutch FTK does not have any direct foundation in the capacity of pension funds to remain solvent over the long term, a criticism that was well voiced during the consultation period. Similarly, to the extent these are based on a perceived “average” member of the fund, they may be poorly aligned with the diverse requirements of members with widely varying time horizons or differing risk appetites. In this respect, risk parameters would have to be calibrated to multiple portfolios or the varying financial circumstances of funds sponsors that may so complicate matters that the transparency and capacity to administer the system are lost.

A second general problem is that the solvency standards are potentially procyclical in nature. Funds holding more volatile assets will have incentives to sell these when faced with market fluctuations. If pension funds are sufficiently large, these can become potentially self-reinforcing cycles that exacerbate instability and ultimately limit the potential diversification and therefore risk management capacity of the funds.
Finally, the political economy of the RBS of pension funds remains untested. By their very nature these approaches presume that some level of risk is appropriate for pension funds and seek to calibrate their parameters to this standard level. None have yet to weather the kind of perfect storm of nearly simultaneous asset meltdowns and interest rate collapse or contagion effects associated with their introduction. It remains to be seen whether politicians will be able to sustain reasonable risks when the real losses to members’ accounts are incurred, or will retreat into the mode of absolute security at any cost when faced with angry pensioners marching on the streets. In principle, even an event with a probability as low as 2.5 percent will occur within the period in which an individual is involved with the pension system.

Despite these challenges, RBS methods are likely to continue to gain acceptance because they offer the prospect of advantages relative to other approaches. They provide a forward-looking paradigm around which to organize supervision that offers the promise of reduced risk of insolvency of DB funds and potential efficiency gains in DC systems that impose investment restrictions. They potentially provide a common framework to assess the relative risks of DC funds that function in a prudent-person investment regime. However, as in all such matters, there is likely to be no free lunch. Risk-based supervision systems may lead to more conservative portfolios in DB funds and constrain DC funds to a presumed average risk tolerance, depending on how they are designed. The ability to use derivatives may to some extent mitigate these outcomes, but this is not applicable to all countries. Risk-based methods, which will enable supervisors to better allocate their scarce resources, will also impose new technical requirements and a higher level of sophistication from all parties. The further development of these systems will be closely monitored and undoubtedly provide many more useful lessons as others consider how to proceed down this path.

Notes

1. Sahajwala and van den Bergh (2000) provide a study of a number of supervisory risk assessment systems under development in various G10 countries.
2. See also Black (2004) for a comparative analysis of RBS of banks.
3. The total number of individual accounts amounts to 84 percent of the labor force, but a large share of pension fund members moves in and out of formal employment and does not contribute on a regular basis. This phenomenon is
common in Latin America and other emerging countries (Rofman and Luchetti 2006).

4. It is interesting to note in this regard that Australian regulators have recently implemented a comprehensive relicensing program based on much stricter licensing criteria that has reduced significantly the number of funds.

5. Dutch funds can opt for an unconditional or a conditional benefit indexation rule. The latter rule introduces an element of risk sharing, but the Dutch system remains a traditional DB system.

6. It is possible that the introduction of the VaR ceiling was also motivated by the existence of government guarantees, especially the guarantee that workers with accrued rights in the former pay-as-you-go system will not receive a pension lower than the one they would have received (Berstein and Chumacero 2006a).

7. Mexican supervisors also make use of early warning indicators to guide supervisory actions, but this motivating factor was clearly more important in the other countries, where a much larger number of funds is allowed to operate.

8. Standard and Poors and Moody’s have developed their own methodologies for rating the quality of the internal risk management of insurance companies and take the results into consideration in the elaboration of the final ratings. See, for example, Ingram (2006).

9. The implementation of Basel II will impose similar challenges for bank supervisors.


11. The response of pension institutions to the financial turmoil and the growing use of derivatives are analyzed in some detail in Ladekarl and others (2007).

12. The authors are grateful to the staff of CONSAR for providing the calculations used in this chapter.


14. At the same time, the disclosure of score results should not lead pension funds to hold very conservative portfolios.

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CHAPTER 2

Risk-Based Supervision of Pension Funds in the Netherlands

Richard Hinz and Rein van Dam

Introduction

The Netherlands has an extensive pension system with nearly universal coverage and assets of 125 percent of GDP. It was an early adopter of risk-based supervision methods (RBS) and is one of the most developed risk-based systems in operation. The Dutch system includes requirements for pension funds to have specific governance procedures to ensure that overall risk management is undertaken effectively, RBS is included in fund operations, and risk measurement tools are a foundation for the regulation and supervision of pension funds.

The primary RBS tool in the Netherlands is the Financial Institution Risk analysis Method (FIRM), introduced in 2006 to provide a common framework for the evaluation of all types of institutions within the authority of De Nederlandsche Bank (DNB), the Dutch Central Bank that serves as an integrated financial supervisory authority. The quantitative risk-based solvency framework, Financieel Toetsings Kader (FTK), which established requirements for risk-based solvency standards for pension funds, was proposed in 2004 and formally became effective on January 1, 2007.
The supervisory system in the Netherlands is reflective of the underlying nature of the pension system, which has three main components:

- a universal mandatory old-age pension provided to all citizens (first pillar)
- primarily defined benefit (DB) private occupational pension schemes sponsored by employers and professional organizations (second pillar)
- individual pension schemes offered by insurance providers (third pillar).

The Dutch pension system is designed to provide a minimum income for all citizens and a high replacement rate for persons with a full working career. The foundation of the system is a basic old-age pension given to all residents at a level related to the net minimum wage. This basic pension is supplemented by a combination of employment-based benefits and individual savings.

**The First Pillar: Basic State Pensions**

Membership in the first pillar, the Algemene Ouderdomswet (AOW), is mandatory for all persons between the ages of 15 and 65 who work in the Netherlands. All persons who pay income taxes are required by law to also make contributions to the pension system. When workers reach age 65, they are eligible to receive a basic pension benefit equivalent to 70 percent of the net minimum wage. No distinctions are made on the basis of gender, occupation, or employment status. There is no means test for benefit eligibility, and other forms of income have no effect on the level of the AOW benefit.

Rights to the basic benefit are accrued in increments of 2 percentage points per year of residence in the Netherlands, resulting in full entitlement after 50 years. Eligibility for benefits begins at the age of 65. If a gap occurs when a person resides outside the Netherlands, the benefits are reduced accordingly. Persons with insufficient residence history who are not entitled to the full AOW benefit but subject to means testing may be entitled to receive social assistance. Basic old-age pensions are financed on a pay-as-you-go basis (PAYG). Dutch residents with no income do not have to pay the contribution but still accrue the entitlement. The AOW is administered by the Sociale Verzekeringsbank (Social Insurance Bank; SVB).

**The Second Pillar: Occupational Pensions**

The second pillar consists of occupational nonstatutory pension schemes that supplement the state pension and has four types of providers:

- company-specific pension funds
- industry-wide pension funds
• insurance providers managing group life insurance contracts for separate enterprises
• pension funds for the self-employed operated by professional associations.

At the beginning of 2006, 800 pension funds were in operation; 685 were company-specific, 103 were industry-wide, and 13 were profession-specific. The total assets of these occupational funds amounted to approximately 624 billion euros at the end of 2005, equivalent to 125 percent of gross domestic product (GDP). In addition, approximately 40,500 companies that do not have pension funds have pension agreements with insurance providers.

The pension sector is fairly concentrated. The Dutch Civil Servants’ Pension Fund ABP, the largest fund, with an invested capital of 200 billion euros the end of 2006, represented over 30 percent of total assets and about 40 percent of GDP. The second largest fund, PGGM, the pension fund of workers in the health and social work sector, with a pension capital at the end of 2006 of 80 billion euros, represented over 10 percent of total assets.

Although no federal law imposes universal participation in the second pillar, occupational pension funds have nearly six million active members, or the equivalent of 90 percent of employment. The high coverage ratio is due to the inclusion of pension plans in labor contracts and collective bargaining agreements. If an employers’ organization and a trade union that employs more than 60 percent of the workers in an industrial branch wish to establish an industry-wide pension fund, under the Mandatory Membership of an Industry-wide Pension Act of 2000 they may request the government to declare that the pension agreement is binding on all employers and employees in the industry. However, individual companies may be exempted from the membership under certain conditions, such as the existence of an individual pension fund or poor investment performance of the industry-wide fund.

As of January 2004, approximately 97 percent of all active members participated in a DB scheme. The vast majority of these members (77 percent) are in career average pay schemes. Only 13 percent were enrolled in a final salary scheme, a decline from 58 percent as recently as 2002. The remainder (10 percent) participated in some other type of scheme. A common example of an alternative design is one that provides a defined benefit (DB) up to a specified level, and benefits above this level are provided on a defined contribution (DC) basis.
Social partners (including employers’ organizations) play a key role in the design of pension schemes and continue supporting DB systems, although they are now trying to develop approaches that minimize the risks with these schemes in order to maintain them. One of the most popular new designs is called a “collective DC” or conditionally indexed plan. In these schemes the pension fund promises the employees a target DB, but the contribution of the employer is fixed for the specific time horizon, commonly five years. The fixed contribution includes a realistic allowance for solvency risk and indexation. If the contribution proves to be greater than what is required to fund the targeted benefit level, indexation of benefits may be increased or a more aggressive asset allocation strategy may be adopted. If the contribution is not sufficient to finance the promised benefits the indexation or even accrued benefits have to be decreased rather than increasing the required contributions. The allocation of contributions among workers and employers varies from one pension scheme to another. According to the data of Statistics Netherlands, the Centraal Bureau voor de Statistiek (Central Bureau of Statistics; CBS), the average employer payments accounts for approximately 80 percent of all contributions.

Defined benefit formulas are integrated with the AOW. This integration is known as the “AOW franchise.” The typical formulas provide annual accrual rates between 1.75 and 2.25 percent of salary (either career average or final pay) including the basic pension. After a career of 35 to 40 years, the total pension benefit targeted by these schemes will be approximately 70 percent to 80 percent of earnings.

As shown in figure 2.1, the investments of pension funds has evolved from an early concentration in loans to relatively stable portfolio allocation of approximately 40 percent in equity and alternative investments, 50 percent of assets in fixed-income instruments, and 10 percent invested in real estate. Foreign assets account for 85 percent of the portfolio. The majority of these foreign investments are in European Union (EU) countries. Foreign exchange exposure is estimated to be 15 percent of total assets. The larger funds have greater exposures to equity and foreign exchange although many fully hedge this currency exposure. Many of the large funds have internal asset management and risk management sections. Smaller funds typically outsource portfolio management. Small pension funds also often purchase group pension agreements. Life insurance companies fully reinsure 14 percent of branch pension funds and one-third of company pension funds.
The Third Pillar: Individual Pension Products
The third pillar of the Dutch pension system consists of individual pension products sold on a retail basis by licensed insurance companies and supervised by the insurance branch of DNB.

There are no restrictions on access to these products; they may take the form of annuities as well as endowment products. The value of this third pillar is equivalent to about 7 percent of the liabilities of occupational funds.

Motivations for Adopting Risk-Based Supervision
Three factors strongly influenced the development of RBS: the development of methods applied to banking, the perceptions of a changing environment that required new techniques, and the need to allocate limited supervisory resources efficiently. Changes in the operating environment of pension funds were a major impetus in the evolution of pension supervision. Increasing globalization of financial markets; the introduction of complex financial products; and the development of new asset management, trading, and hedging strategies made the oversight of financial institutions a far more complicated process. These innovations rendered many of the older supervision methods obsolete and required

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Figure 2.1. Asset Allocation of Pension Funds in the Netherlands, 1980–2005

Source: Kakes and Broeders 2006.
the development of new approaches to effectively evaluate the soundness and stability of financial institutions. The complexity of products and methods and the rapid increase in the volume of transactions made it impractical for supervisors to monitor every transaction or obtain full information about all of the activities of a pension fund.

Another consequence of globalization and the rapid evolution of financial services was the increase in the speed of transactions and volatility of markets. This increase raised the stakes for all financial supervisors, because the time between the emergence of a problem and the failure of an institution become more compressed. In response, supervisors had to develop strategies to preemptively assess and manage risks rather than react to their consequences. This has led to the introduction of regulatory and oversight techniques that are risk-oriented and pro-active rather than compliance-oriented and reactive.

The challenges of the new environment were accentuated by the consolidation of financial services into integrated multinational conglomerates. Banking, insurance, and asset management became increasingly integrated in response to the competitive pressures of a global economy. In 2004, the existing authority for the supervision of pensions and insurance was merged with the DNB into a single supervisor of banks, insurance companies, and pension funds, reinforcing the need for commonality of methods.

A more immediate catalyst for the adoption risk-based methods was the failure of a relatively new insurance company, Vie d’Or, in 1993. This was only the second insurance company to default since 1924. The fact that an insurance company actually reached the point of failure and the resulting negative publicity led to an examination of existing methods and provided a strong impetus to move toward a supervisory system that would prevent future failures by establishing a more pro-active approach and focusing resources on higher risk entities.

**Motivations for Adopting Solvency Standards**

Principle-based regulation of pension investments and funding levels were established by the Actuarial Principles for Pension Funds (APP 1997). Supervisors relied on extensive annual and quarterly reports to develop early warning signals and determine supervisory priorities, but these indicators were not explicitly communicated to the pension funds. Quantification and management of risks was seen as a strict responsibility of pension fund boards, advised by their actuaries.

A steady decrease in market interest rates and a rapid decline in the value of equities in the 2000–02 period lead to a sharp decrease in funding
ratios as shown in figure 2.2. This increased pressure for more transparency and a new approach. On September 30, 2002, the Pensions and Insurance Supervisory Authority of the Netherlands (Pensioen & Verzekeringskamer; PVK) sent a letter to all pension funds, informing them of more stringent rules on the valuation of the liabilities (including acceptable discount and projected inflation rates) and the buffers needed to absorb investment risks. This letter—after consultations by the supervisory authority with labor unions and employers’ organizations—led to the promulgation of new funding regulations that the supervisor had been developing since the 1997 publication of the APP. A draft of the FTK was issued in October 2004 for voluntary use by pension funds during a consultation period. The standards were revised based on the consultations and became mandatory for all funds as of January 1, 2007, the effective date of the new pensions act (pensionwet) into which they were integrated.

The Regulatory Framework for Pension Funds in the Netherlands

The regulatory framework for Dutch pensions is composed of a legal framework that is supplemented by guidelines and standards promulgated the supervisory authorities.
The main law and secondary regulations
The new pensions act that replaced the Pension and Savings Fund Act of 1952 integrates funding standards proposed in the FTK, imposes new requirements for pension agreements between employees and employers, and establishes additional communication requirements on funds. It also contains a variety of provisions that integrate responsibilities into a common concept of a pension administrator, creates new governance standards for pension funds, creates some relief for small plans, and requires specific disclosure of the indexation policy of pension funds.

This statute is now the primary source of regulatory authority over pension funds. In addition to this statute, there are other laws governing mandatory participation in an industry-wide pension fund as well as professional groups. The government has also issued secondary regulations that interpret and apply the laws. These include Orders in Council and ministerial regulations. Orders in Council are initiated by the Crown (in fact the government) and laid down in a royal decree after consultation with the Council of State. These orders have the same authority as Acts of Parliament, without being formally approved by Parliament. Ministerial regulations provide a third level of authority that the ministry may initiate and issue.

Policy rules are often initiated and issued by the institution with responsibilities under specific sections of the legislation. Policy rules are binding; an entity subject to the authority of that institution who does not comply with a policy rule may be subject to sanctions or other consequences.

The law requires the submission of the founding documents of pension funds to the Supervisor within three months after the fund’s establishment. Included in this requirement are: articles of association, scheme rules and a description of the financing arrangement. The Supervisor does not have the right of approval, but assesses these documents based upon the relevant regulations and legislation. If the Supervisor concludes that the pension fund does not meet the relevant requirements it can request that these documents be amended.

Investment control is based on the prudent person approach. The only quantitative restriction on investment is a 5 percent limit on self-investments (instruments issued by the sponsor). If the pension fund has sufficient free assets this can be stretched to 10 percent. The remainder of the portfolio is subject to more general rules about appropriateness and suitability.

In 2002 prudential supervision of pension funds was consolidated through a merger of DNB and PVK. This unified in a single body the
authority over a range of financial institutions. Prior to the merger, DNB supervised banks and other credit institutions while also serving as the Dutch central bank. The PVK had authority over pension funds and insurance companies. As of November 1, 2004, the two bodies became formally integrated and operate together under the name De Nederlandsche Bank (DNB).

Supervision of market conduct is performed by the Netherlands Authority for the Financial Markets (Autoriteit Financiële Markten; AFM), which focuses on actions of institutions and operations of financial markets and exchanges. The AFM is responsible for the oversight of those aspects of pension regulation related to the conduct of transactions in these markets.

Quality of governance—The pension law and regulations emphasize the role of the board and the management in ensuring the integrity and soundness of the pension fund. The regulations establish the following requirements:

- a board member’s test to be conducted by the supervisor to determine the capability to fulfill the required duties
- the obligation for managers to act solely in the interests of the members when discharging their duties
- the imposition of a code of conduct that applies to board members, managers, and other employees of the fund
- the obligation to notify the supervisory authority of changes in the identities of board members and managers in advance of any changes
- the obligation to notify the supervisor in writing of changes in the antecedents of board members and managers on a timely basis
- the obligation for a pension fund to have at least two day-to-day managers.

In addition, the new pension act requires the installment of an accountability body that reviews the actions of the board and renders a judgment on the consistency of those actions with the requirements of the law and needs of the fund. The law requires a process of internal supervision that requires an annual report by a separate body on board procedures and processes and the manner in which long-term risks are managed.

Requirement for a written business plan—All funds are required by the law to draw up an actuarial and technical business report (actuariële en
bedrijfstechnische nota [abtn]). This is both a policy document to guide the actions of the board and a document in which the actuary explains the financial basis of the pension fund and the assumptions used for the calculation of contributions, the investment policy, and benefits. The abtn is necessary for every pension fund, regardless whether it is a DB and DC. Most of the actuarial consulting firms have developed a model abtn for their clients. These standard models are discussed and informally approved by the supervisor and then is tailored to the specific requirements of individual funds.

The abtn is required to outline the following:

- basic structure of the financial management system and the policies underlying the accounting and internal control procedures
- terms and conditions under which employees are entitled to become members of the pension scheme and the procedures and criteria applying to employers who wish to join the fund
- rights accruing to members, former members, or their surviving dependants under the terms of the pension scheme
- risks arising from past commitments that the fund has decided either to self-insure or to reinsure or transfer to an insurance company
- funding policy
- financial management instruments.

The funding policy is required to include the following:

- valuation method and relevant assumptions
- contributions policy
- way in which the valuation of the technical provision, the contributions policy, and the investment policy take account of any contingent indexation used by the fund
- fund’s investment policy, which should include a description of the specific investment objectives, the strategic asset allocation, and the extent to which divergences are permitted from the strategic asset allocation
- required capital against the balance sheet risks
- policies underlying the fund’s asset management activities, and the way in which the fund quantifies and manages risks, notably market risk and credit risk
- way in which the results of all of these activities are to be evaluated
- accounting policies underlying the statement of investments on the balance sheet.
The role of auditors and actuaries—The auditor and the certifying actuary play an important role in many aspects of risk-based supervision. The auditor must report on whether the annual accounts of a fund give a true and fair view. The actuary must draw up its actuarial report and certify the soundness of the fund. If required, both the auditor and the actuary must provide the supervisor with information on their findings and assessments. The board of directors of the fund is afforded the opportunity to be present when the auditor or actuary provides information to the supervisor. The law also specifies a number of examples of situations in which an auditor or actuary shall notify the supervisor as soon as possible of any circumstance which indicates that a fund is in violation of the requirements stipulated in the law, jeopardizes the fulfillment of the DB obligations of the fund, or results in a refusal to issue a statement testifying to the completeness and accuracy of the annual accounts or in issuing a qualified opinion.

This whistle-blowing regulation has not been used very often. This is probably because the close supervision of each individual pension fund leads auditors and actuaries to perceive that the Supervisor already is aware of most of the relevant circumstances.

Code of conduct—A pension fund is required to have a code of conduct stipulating rules for board members and employees of the fund, including the following:

- correct use of confidential information
- disclosure of possible conflicts of interest
- disclosure of private and business transactions that may be related to the fund’s activities
- disclosure of gifts and loans from business acquaintances
- transparency about all sources of employment
- appointment of a compliance officer.

Internal controls and pension fund governance—The new pension act establishes an updated framework for pension governance, with which all were required to comply by January 1, 2008. This makes some additions to the framework set out in a policy rule on internal control principles. The basic principle is that the administrative organization must form part of the overall internal control process and that this process must be subject to oversight by the institution’s senior management and include
a defined process for accountability of the board and internal supervision. Each fund is required to do the following:

- have a defined framework of fund governance
- conduct an analysis of the identified business risks
- establish management information and communication systems
- have a defined process of monitoring adherence to procedures
- establish procedures for internal supervision of the board
- have an accountability body that issues a judgment on the actions of the board.

**Actuarial Principles and Funding Requirements**

The Actuarial Principles for Pension Funds, issued in 1997, established guidelines for the measurement of pension funds assets and liabilities. Liabilities were defined as the accrued benefit obligations (ABO). The discount rate for the pension benefits with conditional indexation was required to be at a fixed level of 4 percent per annum, a discount rate that has been applied since the end of the 1960s. For pension funds with no indexation, the applied discount rate was allowed to be higher depending on the actual market rate.

The current value of assets was required to be at least equal to the present value of the liabilities on an ongoing basis. Standards for the adequacy of the funding buffer were not included in the APP. Actuaries were required to certify the sufficiency of the buffer, taking into account the potential volatility and possible depreciation of assets.

A written strategic investment plan was required to specify the asset categories, geographic allocation, sector allocation, currency allocation, and performance benchmarks. Implementation strategies including choices between passive or active management were required, in addition to procedures for risk measurement and analysis of investment results.

The supervisor reviewed the policy of the fund to assess compliance with the standards. These assessments began using internal early warning signals, involving the funding ratio in relation with the asset allocation of a pension fund’s investments. These warnings signals are in the process of being replaced by the more specific criteria that have been developed in recent years, most significantly, the assessment of the risk profile and risk management attributes of the fund proposed in recent years. If the risk attitude of the fund did not comply with these criteria, consultations between the fund and the supervisor are initiated and the fund is required to convince the supervisor that the risks were being effectively managed.
**Annual Statements**
Annual returns constitute an important source of information for supervision. These have a standard form (laid down in an Order in Council) and are submitted in electronic form. A large proportion of the work entailed in the assessment of returns is automated. From 2007 onward all assets and liabilities will be required to be valued at market value.

**Quarterly Statements**
To address the growing exposure to investments risks, since 1989 quarterly reports on the investments of pension funds have also been required. These include the following:

- asset allocation (including the benchmarks established in the abtn and additional strategic investment plans)
- detailed information on equity holdings (including euro, non-euro, U.S., and emerging markets)
- specifics of the bond portfolio (including the modified duration of the benchmark)
- currency exposures
- transactions during the quarter
- performance measurements (time weighted return versus benchmark).

**Revised Funding and Solvency Standards**
The global collapse of stock prices beginning in spring 2000 led to a significant change in the application of the APP and the discretion given to boards and actuaries to determine solvency criteria. On September 30, 2002, a letter was sent to all pension funds setting out more concrete and stringent rules on the valuation of liabilities (discount and inflation rates) and the required level of funding buffers, significantly limiting the discretion of boards. In addition the letter established rules for rebuilding the funding status. Prior to this point, the policy, although not formally published, was to permit the funding buffer to decline during periods of falling asset values, even to zero. This implicitly assumed that net returns on assets (in particular equities) would revert to historical means over reasonably short periods.

The letter significantly revised this approach by tightening the parameters for funding and establishing requirements for a maximum funding recovery period. Specifically it required the following:

- a maximum period of eight years for the reestablishment of the required funding buffer
• continued use of a 4 percent discount rate in measuring liabilities
• establishment of reserves of at least 5 percent of the technical provision for the purpose of cushioning risks that are not explicitly quantified, such as general operating risks
• establishment of an investment risk reserve sufficient to ensure that the fund has adequate financial resources to implement its risk management strategy
• more specific enumeration of the funding buffer that requires funds to be able to:
  • absorb a 40 percent decline in value of their securities portfolios relative to their peak benchmark value of the previous 48 months (using the funds’ own benchmark as incorporated in their abtn or investment plan)
  • absorb a price decline of up to 10 percent of their assets relative to the lowest point of the benchmark in the previous 12 months.

If a fund has a financial risk management system that is at least partially based on an asset liability matching (ALM) model, the required buffers may also be determined using the relevant model. It must, however, take into account the basic criteria outlined above as well as portfolio mix, hedging policy, and other relevant factors. If the fund chooses this approach, it is subject to the supervisor’s evaluation that will be undertaken using conservative parameters:

• maximum 5 percent average return on fixed-interest securities
• average of 3 percent per year of wage growth
• average inflation rate of 2 percent
• maximum equity risk premium of 3 percent.

The New Financial Assessment Framework

In conjunction with the publication of the APP in February 1997, the supervisor announced the intent to develop an FTK. With the consolidation of supervisory authority this effort has been extended to include the development of standards that apply to all of the entities within DNB’s authority.

The proposed basic principles of the FTK were published in September 2001. In October 2004, the supervisor issued a consultation document explaining the way in which the new FTK framework was expected to be implemented. The consultation document included a solvency test and a continuity analysis. One major innovation is the introduction of
mark-to-market valuation, implying the use of market prices for the valuation of both liabilities and assets. Another is the mandatory analysis of the manner in which institutions safeguard continuity through the design of their financial structure to enable both institutions and their account manager to make timely adjustments. Through lengthy consultation with a range of stakeholders, the FTK was further developed and included in the new pension law. It became formally effective for all funds on January 1, 2007.

Objectives and Development of Risk-Based Supervision

The risk-based methods now in place include several main elements that address the various objectives of the overall system.

The Financial Institutions Risk Analysis Method

The framework for RBS of pension funds was first implemented in March 2003. Its development was derived significantly from methods established for banking. With the consolidation of supervisory authority in the DNB, the similar risk-based methods in use for the full range of financial institutions were consolidated into the more comprehensive system, FIRM. A comprehensive manual was developed and published in November 2005 and the methods formally applied in 2006.

The key objectives of FIRM are as follows:

- **More explicit risk analysis process**: The risk analysis framework establishes a comprehensive set of tools to evaluate risk levels and the capacity of mitigating controls to manage these risks. The procedures are designed to address all of the key risks of a supervised institution. The framework also provides insight in the so-called white spots of the supervised institutions, those aspects for which the supervisor currently has insufficient information to make a full assessment of risks.

- **Greater consistency of procedures**: The fully documented and consistently applied procedures to address a common taxonomy of risks and their associated control measures. This ensures that the standards of the law are consistently applied and that interventions by the supervisor are undertaken pursuant to documented criteria and procedures.

- **Improved allocation of supervision resources**: The results of the risk analysis processes provide the basis the focus of the supervisor’s activities on institutions that have indications of high inherent risks or ineffective risk control. This enables the supervisor to deploy the staff
with the specific skills and expertise required to address the types of risk of greatest import to individual pension funds.

- **Increased transparency:** The risk analysis framework provides structured guidance for the risk analysis process. This increases the transparency and consistency of outcomes and the accountability of the supervisor as an institution. Also, the transfer of knowledge and experience among supervisory staff is improved.

- **Better coordination with other supervisory authorities:** The Federal Reserve Board (Fed) in the United States, the Financial Services Authority (FSA) in the United Kingdom, and other supervisory authorities also have designed and implemented a risk analysis methodology. FIRM has been designed in consideration of methodologies developed by the Fed and FSA, as well as methods developed by auditing firms. Consultations took place with the AFM, which is responsible for regulating behavior of the financial markets in the Netherlands. The result was a rather similar risk analysis process among the relevant authorities in the Netherlands. This facilitates the communication among supervisory authorities, especially in terms of exchanging assessment results for multinational institutions.

**Key Objectives of the Funding Standards**

The principles developed through the FTK consultation process and included in the new pensions act provide the basis for the evaluation of a pension fund solvency in the FIRM, providing a comprehensive and objective tool for assessing the financial position of pension funds. This effectively creates a risk-based capital rule establishing the level of the required buffers and funding depending on the risk profile of the institution. The risk-sensitivity helps the supervisor identify the funds that require more attention and facilitates early interventions. Finally, the standards promote professional risk management by giving incentives for the use of internal risk models.

The methods used in the supervision of financial institutions in the European Union are converging. This process began with the development of new financial solvency standards for banks, commonly known as Basel II and continues with the current development of similar standards for the insurance industry known as Solvency II. National pension regulators have not yet been able to reach a similar level of coordination, but there is a movement toward the establishment of risk-based capital buffers for pension funds as well. The development of FTK in the Netherlands is in line with these international developments.
Figure 2.3 illustrates how FTK conforms to the basic concept of Solvency II. Whereas many international solvency requirements for pension funds focus only on capital requirements, FTK, incorporates both quantitative and qualitative elements in assessing the sustainability of the funding policy, and conforms more closely to the basic concepts of Solvency II.

**Organization of the Supervisor**

The integrated supervisory authority in the Netherlands, the DNB, is organized around several operating directorates aligned with the various types of institutions for which it is responsible. These include groups responsible for international conglomerates, banks and other financial institutions, insurance companies, and pension funds. These groups are supported by a number of units headed by a director performing traditional crosscutting staff functions such as legal services, audit, research, and statistics.

Initially, the supervision of insurance companies and pension funds were integrated within two divisions of the DNB, one of which was responsible for the larger funds and companies and the other for the remainder. In 2005 the responsibility for insurance and pensions was realigned into the current two divisions that separate responsibility for the two types of institutions. The pension funds division is allocated 82.5 full-time equivalent staff. An interesting innovation in the organization is the use of a semi-matrix structure in which there is a supervisory policy division with

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**Figure 2.3. The Basic Concept of Solvency II**

- Solvency capital requirement (SCR)
- Minimum capital requirement (MCR)
- Supervisory review process
- Disclosure requirements
- Solvency test for determining the SCR
- Continuity analysis as self-assessment of the pension fund
- Annual and quarterly financial reports

*Source: Authors.*
responsibilities across all types of institutions and “centers of expertise” within each of the functionally distinguished divisions. Within the pension funds unit is one department responsible for large funds and three divisions responsible for the smaller funds. There are also “centers of expertise” for material compliance and reinsurance and ALM.

Day-to-day management of DNB is undertaken by a governing board, consisting of the president and four directors appointed by the Crown for seven-year terms. One of the directors is responsible for the pension funds group.

**Conduct of Risk-Based Supervision**

The implementation of supervision of pension funds is organized around creating a standardized framework for evaluating the organization and functions of the pension institution and measuring the risk associated with the constituent elements to produce a net risk measure.

**Overall Supervision Framework**

Supervision is based on the ongoing process of information collection, consultations with the supervised entities, and a structured process of evaluation of the risk to which pension funds are exposed and the manner in which these risks are managed. Under the FIRM system this consists of two main elements: assessing the solvency position of the fund using the FTK framework; and evaluating the structure of the organization, the nature of risks to which it may be exposed, and considering the quality of risk management procedures. This method results in an assessment of the net risk of the institution that becomes the basis for decisions regarding the degree of future monitoring and potential interventions.

**Implementation of FIRM**

The assessment of net operating risks consists of four intermediate steps that ultimately lead to an assessment of the net risk of the fund elements. These elements are evaluation of the pension fund profile, the pension fund structure, risk assessment, and control assessment. These elements are outlined schematically and examined in more detail in figure 2.4.

**Pension fund profile**—The aim of constructing a pension funds profile is to develop a comprehensive description that will support the structured assessment of the external influences to which the fund is exposed and the capacity of the pension fund to support the identification of risks and
implement effective controls. In the pension fund profile components of a pension fund are addressed, including history and organization, governance, products and financial profile (premium levels, accrued benefits), strategy and policy, operating environment, information disclosure, and administrative systems (information technology and human resources).

**Pension fund structure and weighting**—The description of the structure is designed to achieve two objectives: to divide the supervised institution into functional units that facilitate review of its operations; and to identify and evaluate all relevant risks and controls. This process has two steps: identifying relevant management units and functional activities, and assigning weights to these units in proportion to their relative importance to the operation of the fund. This process is supported by a set of templates developed to standardize the process of identifying the risks associated with similar types of functional activities. These templates include default scores that serve as a starting point for the weighting process.

There are three types of assessment and weighting frameworks:

- for pension funds that have been fully re-insured
- for pension funds that outsource nearly all their business
- for all others, although this third type is subdivided into pension funds that perform all functions internally and others that only outsource asset management.
No distinction is made between DB and DC schemes. The most important reason for this is that the number of funds with purely DC plans is very small.

**Risk assessment**—The nature of each type of risk is estimated using the functional breakdown of the organization and activities of the fund. The objective of this step is to define the gross (inherent) risks for all significant functional activities. Gross (inherent) risk can be defined as the risk intrinsic to the activities of an institution. Unlike some other RBS systems the FIRM framework does not evaluate probability and impact of risks separately but rather combines these into a single score. This approach is based on assumption that there is a high degree of interdependence between the probability of a risk and the magnitude of its impact. Four levels of risk are assigned scores of 1 to 4 in the system. The risk of each component identified in the evaluation of the organization is presented as a score that combines both probability and impact.

To assist staff in structuring the process and to increase consistency of assessment results, guidelines and default scores have been provided to support the risk and control assessment. Working from this starting point the supervisory staff analyzes each component and adjusts the default scores in accordance with their assessment. For pension funds risks are evaluated within nine categories:

- **External and strategic risks**: These arise from adverse business decisions, improper implementation of decisions, or lack of responsiveness to changes in business surroundings. These include risks related to demographics, competition, technology, reinsurance, interested parties, contagion effects from problems in other aspects of financial markets, and political stability. Reputation risk (arising from adverse perception of the image of the pension fund by counterparties or regulators) is part of this risk category.
- **Operational risks**: These arise from failures in transactions with customers or counterparties, ineffective decision making, and inadequate or insufficient human resources. Examples include transaction processing (correct, complete, and on time), outsourcing and cooperation (assessment of mandates), expenses (levy in premium), staff (quality and quantity), information management, product development (innovation), material (pre-)acceptance (transfer of pension rights), payment, and settlement.
• **Information technology risks**: These arise from inadequate information technology and processing in terms of manageability, exclusivity, integrity, infrastructure, controllability, and continuity. These risks also arise from an inadequate strategy and policy and from inadequate use of the technology.

• **Legal risks**: These arise from violations or noncompliance with laws, policy rules, regulations, agreements, and prescribed practices. Most gross risks should been seen as high, with exception of risks concerning changes in legislation in the future.

• **Integrity risks**: These arise from ethical standards, for example, an ambiguous relationship of the fund with its customers, insider trading, tax evasion, money laundering, or fraud.

• **Technical insurance risks**: These arise from deviations among the actual experience and the assumptions and estimated probabilities on which premiums and/or liabilities are based, for example: mortality, longevity, disability, inflation, or liquidity.

• **Mismatch risks**: These arise from volatility in investment returns in relation to those necessary to meet the liabilities, for example, adverse movements in interest rates, bond prices, stock and commodity prices, or exchange rates.

• **Market risks**: These arise from an institution’s inability to meet its liabilities in relation to variations in investment and premium income.

• **Credit risks**: These arise from an issuer’s failure to meet the terms of any contract with the institution or otherwise failure to perform as agreed, including the possibility of restrictions on or impediments to the transfer of payments from abroad, for example, default probability, concentration and correlation, recovery rate, or country risks.

The lack of knowledge among supervisors of the internal control measures of a pension fund has frequently led to problems in determining specific scores. This has often been the case in relation to information technology risks and operational risks of outsourcing. In these cases, the relevant net risk had to be scored as high, because not knowing the extent of control measures taken by the pension fund implies a high risk from a supervisory point of view. This meant that the pension fund had to be visited very soon to fill this gap in supervisory control. In addition, staff members were afforded some discretion to add risks not included in the categories and determine a risk score based on their professional judgment.
Control assessment—The aim of control assessment is to obtain an insight into the quality of the risk controls for each of the individual risk categories to derive a final value that represents the net risks of the entity. The basic formulation that underlies the FIRM may be represented as:

\[ \text{inherent risks mitigated by controls} = \text{residual (net) risks}. \]

Risk control is evaluated within three categories: risk-specific controls, risk-transcending controls (organization and management), and risk-mitigating effects of group functions.

Risk-specific controls—Risk-specific controls are evaluated separately for each of the risk categories identified in the preceding steps. These are considered in the context of four underlying elements shown in the table from the FIRM manual below (table 2.1).

Risk-transcending controls—Risk-transcending controls are evaluated within a five-element framework that addresses the scope of crosscutting management activities. These are considered in the framework set forth in table 2.2.

Risk-mitigating effects of group functions—The management of the organization has a similar control effect that is not specific to the categories of identified risks. These controls are evaluated using the categories in table 2.3.

Table 2.1. Elements of Risk Controls in FIRM

<table>
<thead>
<tr>
<th>Control item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk identification</td>
<td>The degree to which and the manner in which the institution has independently mapped the specific risk category, through such means as a risk inventory and risk analysis.</td>
</tr>
<tr>
<td>Risk policy</td>
<td>The quality of the written policy with regard to the degree to which (risk appetite) and the manner in which (outline of controls to be implemented) the institution plans to control the risk category concerned.</td>
</tr>
<tr>
<td>AO/IC</td>
<td>The degree to which and the manner in which procedures, function segregations, authorizations, limits, and other preventive measures or other measures have been implemented in order to control the risk category concerned and thus to implement the appurtenant risk policy.</td>
</tr>
<tr>
<td>Risk monitoring</td>
<td>The degree to which and the manner in which the specific risk is monitored (and required adjustments are made) and the controls have been implemented, for instance by means of performance, incident or exception reports and analyses.</td>
</tr>
</tbody>
</table>

Sources: DNB 2005.
Table 2.2. Elements of Risk-Transcending Controls in FIRM

<table>
<thead>
<tr>
<th>Control item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational structure</td>
<td>The transparency of the legal or organizational structure, and the extent to which it lends itself to promoting effective operations.</td>
</tr>
<tr>
<td>Supply of management information</td>
<td>The extent to which timely and reliable financial and operational information is available to responsive staff (including management) permitting them to make timely and well-informed decisions and, where necessary, make timely adjustments.</td>
</tr>
<tr>
<td>Human resources</td>
<td>The extent to which adequate HR policies and sound HR instruments are in place, and the qualitative and quantitative adequacy of staff.</td>
</tr>
<tr>
<td>Internal cooperation and communication</td>
<td>The extent to which the internal communication and cooperation among departments and business units and with group functions operates, aimed at effective cooperation in the pursuit of the objectives.</td>
</tr>
<tr>
<td>Audit measures</td>
<td>The extent to which internal and external audits by auditors and actuaries contribute effectively to the identification, analysis, control, monitoring, and reporting of risks.</td>
</tr>
</tbody>
</table>

Sources: DNB 2005.

Table 2.3. Risk-Mitigating Group Functions in FIRM

<table>
<thead>
<tr>
<th>Control item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management quality and structure</td>
<td>The manner in which the institution’s leadership function is effectively performed. Cases in point are:</td>
</tr>
<tr>
<td></td>
<td>• the competence of the (board of) management as a whole to manage the institution;</td>
</tr>
<tr>
<td></td>
<td>• the extent to which the (board of) management is adequately balanced in terms of expertise and background;</td>
</tr>
<tr>
<td></td>
<td>• the extent to which the management structure and composition match the size and complexity of the operations;</td>
</tr>
<tr>
<td></td>
<td>• the extent to which responsibilities have been assigned in an adequate manner to the individual members of the (board of) management and the extent to which an adequate span of control has been realised;</td>
</tr>
<tr>
<td></td>
<td>• the extent to which the (board of) management sets an example for the institution’s staff (for instance, by propagating ethical nouns and standards);</td>
</tr>
<tr>
<td></td>
<td>• the (board of) management’s leadership style and the extent to which the (board of) management is respected within the institution.</td>
</tr>
<tr>
<td>Strategy</td>
<td>This concerns:</td>
</tr>
<tr>
<td></td>
<td>• the manner in which the strategy is formulated within the institution;</td>
</tr>
<tr>
<td></td>
<td>• the extent to which this process takes place on an institution-wide basis;</td>
</tr>
</tbody>
</table>

(continued)
Aggregation of scores—In the final step of the process all of the elements of the evaluation of the risk analysis are combined to reach an aggregate score of the pension fund (figure 2.5). Weightings and scores are maintained on a scale of 1 to 4 throughout the process to simplify and normalize the nature of these aggregate ratings. Scores are only permitted to be entered as positive integers. The process of combining assessments of inherent risks with applicable risk-specific controls is illustrated in the examples below.

The objective of the last step in the process is to combine the risk-specific assessments with judgments about broader crosscutting risk management capacities of organization and management to derive an overall score for the institution. The total residual scores by functional activities are combined with the joint score for organization and management. The scores for organization and management are given equal weight to reach a combined score, which is then combined with an aggregate
risk specific score in a ratio of 3 to 1 to reach a total score. This ratio represents an overall policy decision of the relative weighting of the various components. In larger organizations deemed to have multiple management units, this aggregation and weighting are done for each management unit and then combined for an overall score; however, this is not typically the case for pension funds.

Aggregation of assessment results is based on a mathematical algorithm that takes into account the weighting factors of the breakdown structure. The algorithm is based on the principle that emphasis is put on high risks and poor controls to reduce the likelihood that scores are averaged out. This aggregation process is supported by the risk analysis software tool, which automatically calculates the aggregated scores at each organizational level. This approach does not imply that aggregation requires no effort on the part of the supervisor. The account manager should always verify the computed scores and weigh the outcomes.

Sources: DNB 2005.
against professional judgment. Although the FIRM system is based on a
detailed numerical breakdown and analysis of the constituent elements
of the pension fund and its supporting institutions, it is explicitly
designed to enable the supervisory manager to override scores among
individual elements and for the overall institution if they do not comport
with their overall judgment. The overall process is illustrated schemati-
cally in figure 2.6.

The FTK Solvency Standards

The second major component of the RBS of pension funds in the
Netherlands consists of the funding and solvency requirement set forth

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**Figure 2.6. Accumulation of Scores**

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*Sources:* DNB website, FIRM manual.
in the FTK. The FTK has essentially two major elements that correspond to short-term and long-term measures of fund solvency:

1. A short-term solvency test based on the composition of assets and liabilities requires the funds to be expected to remain within a specified funding level corridor over a rolling one-year period. This is essentially a short-term stress test of the solvency position.
2. A long-term continuity analysis that requires the fund to demonstrate that its overall benefit structure and investment strategy are able to sustain the required solvency margins over the extended periods appropriate to pension funds.

Several key principles underlie the FTK and distinguish it from the regulatory framework that preceded it. The FTK is designed to be aligned with emerging international accounting standards that rely on mark-to-market evaluation of assets and liabilities to create a consistent solvency assessment. This is in contrast to prior standards based on actuarial valuation of liabilities. FTK significantly limits the discretion afforded to actuaries and pension funds to determine assumptions and methods for funding.

In addition, the FTK contains specified recovery periods for situations in which the pension fund falls short of the funding requirements. Perhaps its most interesting feature, however, is the manner in which the system retains some degree of flexibility. The FTK imposes very specific criteria and a standard model for the fund solvency requirements. It then explicitly permits, and implicitly encourages, funds to develop internal models that, if approved by the supervisor, are permitted to be used as an alternative to the standard. This standard provides a default framework applicable to all funds and permits individual funds to develop approaches tailored to their unique conditions.

**Funding–asset/liability balance and cost-based contribution rate**—Consistent with the EU’s Directive 2003/41/EC (the EU IORP Directive), the FTK requires that DB occupational pension funds must have asset liability balances sufficient for all accrued benefits. The technical provisions should be calculated with regard to all unconditional pension liabilities without taking into account possible future salary increases (accrued benefit obligation) on a mark-to-market basis. The valuation is defined as the present value of the amount of accrued benefits and other unconditional claims using the most realistic assumptions and current interest
rates. Foreseeable demographic, social, legal, medical, technological, and economic trends must be taken into account when determining the expected value of the liabilities. Expected longevity improvements are required to be reflected in the mortality table and incorporated in the valuation of the liabilities.

A recent forecast of male life expectancy in the Netherlands (CBS) shown in figure 2.7 indicates a continuing strong upward trend. Under the FTK pension funds are required to specifically consider the characteristics of their members that will influence mortality changes and to include a surcharge in their liabilities that reflects reasonable expectations about future mortality increases. This requirement typically results in a surcharge on the order of 5 percent to 8 percent over liabilities calculated using current mortality tables and therefore requiring a commensurate level of additional funding.

A major difference in the FTK over prior practice is the discount rate required to be used in the calculation of liabilities. The previous fixed rate of 4 percent has been replaced by a term structure of zero-coupon interest rates that are derived from the euro swap market. When there is a duration mismatch between assets and liabilities (which is currently the situation for most Dutch pension funds), the requirement for a market-derived discount rate introduces considerable potential volatility into the solvency calculations, especially for funds with younger members who may have liability durations as high as 15 to 20 that can rapidly change in volatile interest rate environments. Contractually enforceable
postretirement benefit indexation must be included in the liabilities calculation. Indexation is assumed to be unconditional unless specific notification to the members is provided. Conditional indexation is not required to be included in the determination of the technical provision.

Funds are required at all times to have assets that have a market value at least equivalent to the technical provision plus a minimum solvency requirement of about 5 percent of the technical provision. The framework for technical provisions is prescribed in the EU’s IORP of Directive. A fund must always satisfy the minimum requirement. If it does not, it should immediately submit a recovery plan to the supervisor, explaining how the minimum capital requirement will be restored within no more than three years. However, under specific circumstances the supervisor may force the recovery period to be one year. In addition, under the FTK pension funds are required to maintain a capital solvency buffer that is able to fulfill the short-term solvency stress test. If the pension fund’s actual funding ratio is below this requirement again a recovery plan must be submitted, this time with a maximum recovery period of 15 years. Minimum annual contributions must be equivalent to the value of benefits accrued during the year plus any required additional costs to retain the solvency requirement. In contrast to the technical provision calculation the contribution may be smoothed using a smoothed or even fixed discount rate.

Every pension fund must disclose the cost-based contribution rate and the actual (stabilized) contribution rate for the applicable year in its annual accounts. In assessing the solvency of a pension fund, the supervisor will take into account the differences between the actual and the cost-based contribution. A complete report on the calculation of the cost-based contribution is required to be filed with the supervisor.

**Capital requirements (solvency buffers)**—In addition to fulfilling the technical provisions related to the funding of the present value of accumulated liabilities, pension funds are required to maintain additional capital that provides a solvency buffer. Consistent with the European IORP Directive the buffer capital is a function of the pension fund’s risk profile. The relevant risks are deemed to be related to the nature of investments, the matching of assets and liabilities, and the volatility of liabilities. The risk-related portion is derived from an estimation of the potential duration mismatch of assets and liabilities and the evaluation of the volatility of the asset portfolio. The legal requirement is that the fund must have sufficient capital to ensure that there is a probability of 97.5 percent that the market value of the assets will not decline below the market value of the
liabilities (that is, a funding ratio of 100 percent). For a typical pension fund that invests 50 percent in equities, has a bond duration of 5 years and liabilities with a duration of 16 years, this will require buffer capital of about 25 to 30 percent over the market value of liabilities.

Considerable flexibility is provided to funds in deriving the level of buffer capital. Three methods are permitted:

The standardized method—Under the standard method the required buffer capital is derived from an assessment of risks based on a number of scenarios defined by the pension act. The scenario approach is based on the assumption of a single shock occurring in each risk factor. The shock for each risk driver is based on relevant historical experience. This standardized approach takes account of all of the characteristics of risks and their potential interactions. It is anticipated that this will encourage pension funds to implement their own internal models which are expected to result in a lower buffer capital requirement.

The following factors are utilized in the standard model:

- **Interest risk (S1):** A standard table that sets an expected change in the value of assets or liabilities that are sensitive to interest rate movements, as shown in table 2.4 is used in the standard model. This table is derived from standard assumptions about the term structure of interest rates and distinguishes each affected element (liabilities, fixed-income instruments of various terms) in relation to their calculated duration.

- **Equity and real estate risk (S2)** that is defined as the effect of a decrease of the value of:
  - 25 percent for equities and real estate investment trusts listed on a stock exchange in mature markets (S2A)
  - 35 percent for equities emerging markets (S2B)
  - 30 percent for private equity (S2C)
  - 15 percent for direct investments in real estate (S2D)

- **Currency risk (S3)** that is defined as the effect of a decrease of all foreign currencies against the euro of 20 percent.

- **Commodities risk (S4)** that is defined as the effect of a decrease of the benchmark of commodities of 30 percent.

- **Credit risk (S5)** that is defined as the effect of an increase of 40 percent of the actual credit spread on the bond portfolio with credit risks. The credit spread of a portfolio is taken as a risk proxy. This implies that the higher the credit spread and the longer the maturity of the credit portfolio, the larger the impact of the shock. The assessments of market risk and credit risk are based on well-diversified portfolios.
Insurance risk (S6) that is defined as the required solvability needed for insurance risks is a prescribed percentage of the value of the liabilities, based on the average age and number of participants in the scheme. For each of these elements a separate calculation is made to establish the required buffer capital. The cumulative value of these amounts in addition to the fair value of current liabilities is the capital that is required to maintain the solvency margin.

The six categories of risks (denoted as $S_1$ through $S_6$) are then combined using the formula:

$$\text{Total} = \sqrt{(S_1^2 + S_2^2 + 2 \times 0.5 \times S_1 \times S_2 + S_3^2 + S_4^2 + S_5^2 + S_6^2)}$$

### Table 2.4. Interest Factors

<table>
<thead>
<tr>
<th>Duration (year)</th>
<th>Factor interest decrease</th>
<th>Factor interest increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.60</td>
<td>0.63</td>
</tr>
<tr>
<td>2</td>
<td>1.51</td>
<td>0.66</td>
</tr>
<tr>
<td>3</td>
<td>1.45</td>
<td>0.69</td>
</tr>
<tr>
<td>4</td>
<td>1.41</td>
<td>0.71</td>
</tr>
<tr>
<td>5</td>
<td>1.37</td>
<td>0.73</td>
</tr>
<tr>
<td>6</td>
<td>1.35</td>
<td>0.74</td>
</tr>
<tr>
<td>7</td>
<td>1.34</td>
<td>0.75</td>
</tr>
<tr>
<td>8</td>
<td>1.33</td>
<td>0.75</td>
</tr>
<tr>
<td>9</td>
<td>1.33</td>
<td>0.75</td>
</tr>
<tr>
<td>10</td>
<td>1.32</td>
<td>0.76</td>
</tr>
<tr>
<td>11</td>
<td>1.32</td>
<td>0.76</td>
</tr>
<tr>
<td>12</td>
<td>1.31</td>
<td>0.77</td>
</tr>
<tr>
<td>13</td>
<td>1.31</td>
<td>0.77</td>
</tr>
<tr>
<td>14</td>
<td>1.31</td>
<td>0.77</td>
</tr>
<tr>
<td>15</td>
<td>1.29</td>
<td>0.77</td>
</tr>
<tr>
<td>16</td>
<td>1.29</td>
<td>0.77</td>
</tr>
<tr>
<td>17</td>
<td>1.29</td>
<td>0.77</td>
</tr>
<tr>
<td>18</td>
<td>1.29</td>
<td>0.77</td>
</tr>
<tr>
<td>19</td>
<td>1.28</td>
<td>0.78</td>
</tr>
<tr>
<td>20</td>
<td>1.28</td>
<td>0.78</td>
</tr>
<tr>
<td>21</td>
<td>1.28</td>
<td>0.78</td>
</tr>
<tr>
<td>22</td>
<td>1.28</td>
<td>0.78</td>
</tr>
<tr>
<td>23</td>
<td>1.28</td>
<td>0.78</td>
</tr>
<tr>
<td>24</td>
<td>1.28</td>
<td>0.78</td>
</tr>
<tr>
<td>25</td>
<td>1.27</td>
<td>0.79</td>
</tr>
<tr>
<td>&gt;25</td>
<td>1.27</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Source: DNB 2006c.
In this formula the value 0.5 is the degree of diversification between the effects of equity risk and interest rate risk. The correlation between interest rates and equities or other types of variable-yield securities has been unstable over time; consequently, the standardized method uses a robust estimate, allowing for the parameter uncertainty (97.5 percent probability level) in that correlation. The $S_2$ in this formula is given by the following formula.

$$S_2 = \sqrt{S_{2A}^2 + S_{2B}^2 + S_{2C}^2 + S_{2D}^2 + 2 \times 0.75(S_{2A}S_{2B} + S_{2A}S_{2C} + S_{2A}S_{2D}) + S_{2B}S_{2C} + S_{2B}S_{2D} + S_{2C}S_{2D}}$$

This assumes a correlation of 0.75 between the categories equities mature markets, direct real estate investment trusts, equities emerging markets, private equity, and direct real estate investments.

**Solvency buffers in the simplified method**—For a number of pension fund whose solvency requirements can be valued in a relatively simple manner, the standardized method may be overly complex. Pension funds with a simple risk profile and operations are allowed to perform the solvency test using a simplified method. Only a few pension funds with high funding levels and relatively low investment risks are given permission to use the simplified method. Under this method the solvency test is confined to assessing the market value of assets against the market value of liabilities. The simplified test requires that the ratio of assets to liabilities on this basis remain in excess of 130 percent.

**The internal model**—The most accurate way of establishing the required risk capital is on the basis of the fund’s own internal model. Unlike the standardized method, the internal model method offers the possibility of incorporating the effect of risk management measures, such as risk limiting systems and stop-loss coverage. A pension fund may, with the consent of the supervisor, use such an internal solvency model. Pension funds using an internal model must establish that their available assets risk will be sufficient to cover the liabilities at a 97.5 percent probability level over a one-year horizon. The requirements for use of an internal model address the following:

- organization: administration, risk control, internal control
- model input: portfolio data, market data
- model: instruments, adequate risk factors, adequate stochastic processes
- risk control: risk limits, management information, stress tests.
The models must permit for a demonstrably accurate estimate of the risks and be thoroughly incorporated into day-to-day operations as an integral part of risk management. A proper internal model relies on a stochastic process for the cash flows of liabilities and investments. The pension fund must provide detailed information on the model’s theoretical basis and empirical evidence of its validity. It must also state the circumstances under which the model is not reliable.

**Continuity Analysis**

Continuity analysis provide an important adjunct to the basic contributions, funding, and buffer capital rules by requiring that the fund demonstrate the viability of the financing arrangements over the extended time periods relevant to pension funds. The continuity analysis allows the board of an institution and the supervisor to identify at an early stage whether the institution will be in a position to continue meeting its solvency requirements in the future.

In contrast to the solvency test that is based on one-year scenarios, the continuity analysis is required to extend over a period of 15 years. In addition, the continuity analysis includes a broader set of factors such as development of the structure and number of participants, anticipated salary increase, and longer-term economic forecasts. The continuity analysis is also required to incorporate stochastic measures.

The components required to be addressed in the continuity analysis are as follows:

- objectives, policies, and policy instruments of the funds
- economic assumptions and expectations: substantiation of the future projections
- future projections based on pension funds own expectations
- sensitivity analysis of assumptions
- application of stress testing
- variance analysis between projections and experience.

Every pension fund should conduct a continuity analysis once every three years. A deteriorating financial position, new pension policy, or changing external circumstances in terms of demography or economic trends also require an updated analysis. In some circumstances, depending on the risk profile or other factors, the supervisor may ask for a continuity analysis and set the assumptions to be used. To assess whether
the contribution is adequate, a fund may also be asked to show compliance with the main principles in the future.

One important objective of the continuity analysis is to assess the indexation quality in the future, both in terms of expected value and risk. The following parameters prescribed in the pension act must be applied to the continuity analysis:

- minimum wage growth of 3 percent and minimum inflation of 2 percent
- maximum expected return on fixed-income investments of 4.5 percent
- maximum risk premium for equities in mature markets and indirect real estate of 4.5 percent (arithmetic) or 3 percent (geometric)
- maximum risk premium for private equity of 5 percent (arithmetic) or 3.5 percent (geometric)
- maximum risk premium for equities in developing markets of 5.5 percent (arithmetic) or 4 percent (geometric)
- maximum risk premium for real estate and commodities of 3.5 percent (arithmetic) or 2 percent (geometric)
- the future term structure of interest rates (for discounting the liabilities), which must be derived from the current term structure, that is, the forward curve.

**Remedies for funding or solvency shortfalls**—If funding levels fall below the amount required to meet the minimum solvency requirements, the pension fund must immediately inform the supervisor and submit a recovery plan. In general, recovery plans must restore the minimum funding ratio (current value of assets at least equal to the current value of liabilities) within three years and buffer capital requirements (above the minimum of 105 percent of liabilities) within 15 years. The recovery plan will be determined in part by the extent to which the policy established in the abtn (business plan) and approved by the supervisor is already having the desired effect. The continuity analysis outlined above is also given considerable weight in the determination of the acceptability of a recovery plan. In extreme economic circumstances when a large amount of pension funds have a funding deficit the minister of social affairs can lengthen the recovery periods.

During a recovery period it is still possible to index pensions, but the indexation is not allowed to jeopardize the execution of the recovery plan. Due to uncertain market conditions, the actual course of recovery will differ from the plan. These deviations by external factors do not necessarily require amendment of the plan. Only in extreme cases, or if
the divergence takes place over a relatively long period compared with the whole recovery period, is an amendment necessary. The long recovery period makes it possible that variations in the contribution rate due to a shortfall in buffers can be smoothed over longer periods; and if investment returns revert to projected average levels, the recovery period will be shorter than expected and the fund may be able to revert to indexing pension at an earlier time.

The supervisory policy in relation to recovery plans is summarized in figure 2.8.

Operational Implementation of Pension Supervision
In addition to the collection of information through regular reports, the program RBS is undertaken through programs of direct monitoring of the pension funds and the application of sanction in circumstances where funds are determined to be outside of the applicable standards.

On-site consultations and inspections—The supervisor carries out periodic on-site consultations with representatives of the boards of directors and the management of pension funds. During these consultations, the fund’s current performance is assessed as well as its plans and expectations for the future. Upon the request of the supervisor, the actuary and/or the auditor may be involved in the consultation. The frequency of these consultations will depend on factors such as the size and the risk profile
of the fund. The necessity to update the risk profile and the extent of the
risk control by the pension fund generally requires consultations on a rel-
atively frequent basis with the fund.

The frequency of on-site inspections will depend even more on the
risk profile of the fund than the periodic consultations. During an onsite
inspection information is gathered to complete the information needed
for FIRM and the high-risk areas are examined very closely. The super-
visor will ascertain the risk control measures being taken by the pension
fund. Assessment of these risks and procedures may go into detail
depending on organizational structure and the possible impact of the
risks on the solvency position.

The review of required reports and information obtained through
on-site consultations and inspections can result in the identification of
improvement measures which a pension fund is required to imple-
ment. This is typically done through instructions to change the abtn
(business plan) or a recovery plan. The supervisor assesses the extent
to which pension funds successfully mitigated inherent risks by incor-
porating the recommendations or the recovery plan. The conclusions
of this assessment provide important inputs for planning the following
supervisory cycle.

Sanctions—The supervisor has access to a number of tools and sanctions
to enforce compliance with binding regulations, including summoning of
witnesses, instructions, fines and penalties, guardianship (receivership),
and forced administration. The supervisor may summon witnesses and
experts; who are obliged to obey the summons. The witnesses are required
to give a statement, except if they are sworn to official or professional
secrecy. The experts are required to carry out their task impartially and to
the best of their knowledge. The supervisor may give instructions to the
board of a pension fund to correct any deviations from binding regula-
tions. The board is required to obey such an instruction within the period
stipulated by the supervisor. The supervisor may also send instructions to
the members’ council, the representative central employers’ and employ-
ees’ organizations, and other relevant organizations.

Two coercive administrative instruments may be used, depending on
the type of violation: a cease and desist order or an administrative fine.
The supervisor may also impose a penalty as a fixed amount or per unit
of time if the cease and desist order is not complied with. If the super-
visor has imposed a cease and desist order, it may rescind the order or
suspend it for a particular period on the request of the offending party.
The penalty may also be reduced if the offending party is unable to comply with its obligations.

If the supervisor intends to impose an administrative fine, the person or the institution concerned will be notified of this intention, and the grounds for doing so will also be stated. Except in the case of certain minor breaches, the party concerned will also be given the opportunity to respond. If the supervisor does not change its opinion, it will impose the fine. The notification of the decision sent to the party concerned will include the reason and the provision that has been breached, the amount of the fine, and the information upon which this amount is based. The fine will have to be paid within six weeks.

In circumstances where the supervisor concludes that one of its instructions has not been sufficiently complied with, it may give notice to the board of the fund that, as from a certain date, it may only exercise its powers after having received permission from one or more guardians designated to oversee the funds operations. Where in the opinion of the supervisor immediate intervention is required, this guardianship may be immediately implemented after having given the board the opportunity to express its opinion on the immediate execution. The board shall give the persons designated by the supervisor every assistance. The supervisor may allow the board to perform certain acts without authorization.

At the request of the supervisor, the business section of the Court of Appeal in Amsterdam may appoint an administrator to a pension fund, if the fund is mismanaged to such an extent that the interests of the members and other beneficiaries require an immediate action, or the fund no longer has a board. In this circumstance the administrator exercises all of the authority of the board. Finally, a further power that the supervisor can exercise is to instruct a fund to transfer the risks to a regulated insurance company in order to protect the interests of the members.

**Impact on the Dutch Pension System**

The risk-based methods for the supervision of pension funds are relatively recent in their introduction in the Netherlands. Their development has coincided with a variety of underlying changes including the introduction of the euro, the impending retirement of the postwar generation, and the financial crises of the late 20th and early 21st centuries. These circumstances make it very difficult to attribute observed changes directly to the evolution of the approach to supervision. Nevertheless several relatively simple observations can be made that may provide
some indication of the likely impact, or lack of impact, on the design and operation of the pension system.

The new Dutch supervisory paradigm is significantly directed to ensuring the ongoing solvency of the DB pension funds that represent the vast majority of pension arrangements in the system. Although not formally imposed until the last couple of years, both the FIRM risk scoring system and the FTK solvency standards had very similar antecedents in prior systems that were either announced or put into practice at least five years prior. This represents a time period likely to be sufficient for funds to anticipate their more formal adoption and respond to future expectations.

The new risk-oriented solvency standards impose potentially significant costs in the form of very short recovery periods for funds to adjust to unexpected actuarial or financial outcomes. This requires funds to fully incorporate the funding risks associated with benefits whose present value is highly sensitive to external variables. The more-stringent funding standards and short recovery periods are likely to impose significant demands on plan sponsors in the form of higher contributions as the new standards are introduced. The stress testing and other solvency buffers impose even greater risks on sponsors because of the requirement for mark-to-market valuation of assets and liabilities and the removal of smoothing mechanisms in making the adjustments in changes to these.

As in other settings it would not be unreasonable to expect a rather dramatic decrease in the willingness of employers to sponsor these schemes and a move instead to defined contribution or other forms that shift financing risks to members. A more extreme reaction might be a change in the willingness of employers to participate in the supplemental system at all. This is especially likely if the adoption of risk-based methods is coincident with the imposition of financial accounting standards that require an immediate pass-through of changes in pension fund’s financial status to the income statements and balance sheets of sponsors as has occurred in the Netherlands. Both of these effects can be observed in similar settings, such as the United States and the United Kingdom, where increased interest rate volatility and the imposition of more stringent funding standards has lead to the wholesale termination of employer sponsorship of pension plans and the virtual elimination of defined benefit coverage among new employers and younger workers. Although some of this has been offset by a rapid increase in DC arrangements, despite the overall aging of the workforce there has in fact been a slight decline in pension coverage in these settings.
The Netherlands however has not experienced a similar result. The overall coverage rates within the system remain in excess of 90 percent, one of the highest in the world today, and the total number of members remained essentially unchanged from 2004 when the new standards were proposed.

As indicated in table 2.5 below despite a nearly doubling of the contributions from 2001 to 2005, representing a similar increase in the aggregate share of the wage bill, the number of total members has actually increased by nearly 16 percent.

The latest data from DNB indicate that virtually all of these remain DB plans with DC plan coverage showing a high proportional but very low increase from 2.3 to 3.6 percent of members between 2004 and 2006. The only effect observed in the aggregate system statistics published by the DNB is a continuing decline in the number of funds from over 1,000 in the late 1990s to 860 in 2004 and 798 in 2006. The decline in the overall number of funds may provide an indication of possible economies of scale in diversification and risk management that make small funds more volatile and thus less viable under the new rules.

The continued predominance of DB plans in the face of higher risks and costs, in contrast to what is observed elsewhere when far less restrictive standards have been introduced, must be considered in the context of a system founded in collectively bargained industry-wide arrangements. At a minimum these arrangements are likely to be insulated over the short term to these kinds of pressures due to the rigidities of multiyear agreements. In other respects the system may be viewed as similarly buffered by its quasi-voluntary nature due the industry-wide mandate discussed earlier. In another five years the next financial crisis may be required to conclusively observe any effects of the new rules.

**Table 2.5. Contributions and Membership in Dutch Pension Plans, 2001–05**

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(millions of euros)</td>
<td>12.8</td>
<td>18.5</td>
<td>20.9</td>
<td>22.9</td>
<td>25.2</td>
<td>96</td>
</tr>
<tr>
<td><strong>Gross wages</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(millions of euros)</td>
<td>182.6</td>
<td>189.5</td>
<td>193.8</td>
<td>194.6</td>
<td>196.6</td>
<td>8</td>
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<tr>
<td><strong>Contributions as</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>percent of gross</td>
<td>7.0</td>
<td>9.8</td>
<td>10.8</td>
<td>11.8</td>
<td>12.8</td>
<td>83</td>
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<tr>
<td><strong>wages</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total members</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(in thousands)</td>
<td>5,391</td>
<td>5,905</td>
<td>6,220</td>
<td>6,052</td>
<td>6,246</td>
<td>16</td>
</tr>
</tbody>
</table>

*Source: Ponds and van Riel 2007; DNB.*
However, what can be observed today are dramatic changes in the secondary aspects of scheme design toward what may be interpreted as a partial process of hedging risk exposure in the form of the rapidly decreasing prevalence of benefit indexing. The proportion of Dutch pension funds that provide benefits based on final pay has declined from 54 percent in 2002, just prior to the initial introduction of risk-based rules, to about 10 percent. A less-marked increase in the incidence of conditional indexing of promises benefits to price levels has occurred from 89.9 percent in 2002 to an almost universal 97.7 percent in 2006, although there was very little room for movement in this indicator. In general the preliminary evidence suggests only changes on the margins thus far in regard to scheme design. In effect the pension funds have responded to the new solvency standards through a combination of increased contribution rates and a shift from final pay to average pay arrangements that utilize conditional indexing of benefits, effectively distributing the costs of the new standards among the various stakeholders in the system. This process is facilitated by the structure of the system in which funds are separate entities from the sponsoring employers and both employers and unions are represented on the governing boards.

A more likely area to observe the impact of the new supervisory system is in the investment patterns of funds. Two effects were generally posited in response to rules that impose high costs for duration mismatches: a movement away from equities to fixed income in the asset allocation, and increases in the duration of fixed-income portfolios to limit exposure. The aggregate balance sheet information on pension funds does not appear to support the first of these expectations (table 2.6). Although the value of shares and other variable yield securities declined from 42 percent of assets to 35 percent between 2001 and 2002 in response to major price changes, by the end of 2005 it had returned to 42 percent of the total. Over the same period, bonds and other fixed-yield securities increased as a share by only 4 percentage points. This is consistent with the observation of a study published by the DNB in December 2006 that concluded that the investment behavior of pension funds was consistent with rebalancing to reach a relatively constant asset allocation mix (DNB 2006a). The observed pattern of asset allocation may point to a strategy of continuing to pursue yield premiums in the equity markets by pension funds while hedging the resultant exposure with new derivatives, an issue that will no doubt be the subject of future research.

The available evidence does seem to indicate the second expected impact: lengthening of the duration of the fixed-income portfolios to
## Table 2.6. Asset Allocation of Dutch Pension Funds, 2001–05
(euros, millions)

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>%</th>
<th>2002</th>
<th>%</th>
<th>2003</th>
<th>%</th>
<th>2004</th>
<th>%</th>
<th>2005</th>
<th>%</th>
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<tbody>
<tr>
<td>Land and buildings</td>
<td>49,609</td>
<td>11</td>
<td>46,564</td>
<td>11</td>
<td>48,355</td>
<td>10</td>
<td>52,452</td>
<td>10</td>
<td>60,794</td>
<td>10</td>
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<tr>
<td>Investments, nonconsolidated</td>
<td>2,922</td>
<td>1</td>
<td>2,916</td>
<td>1</td>
<td>4,721</td>
<td>1</td>
<td>6,222</td>
<td>1</td>
<td>466</td>
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</tr>
<tr>
<td>Shares and other variable-yield securities</td>
<td>192,924</td>
<td>42</td>
<td>149,231</td>
<td>35</td>
<td>190,764</td>
<td>40</td>
<td>214,695</td>
<td>40</td>
<td>259,500</td>
<td>42</td>
</tr>
<tr>
<td>Bonds and other fixed-yield securities</td>
<td>165,219</td>
<td>36</td>
<td>176,356</td>
<td>41</td>
<td>189,525</td>
<td>39</td>
<td>218,090</td>
<td>40</td>
<td>249,939</td>
<td>40</td>
</tr>
<tr>
<td>Mortgage loans</td>
<td>14,331</td>
<td>3</td>
<td>15,464</td>
<td>4</td>
<td>14,560</td>
<td>3</td>
<td>14,136</td>
<td>3</td>
<td>12,591</td>
<td>2</td>
</tr>
<tr>
<td>Private loans</td>
<td>22,189</td>
<td>5</td>
<td>14,772</td>
<td>3</td>
<td>10,834</td>
<td>2</td>
<td>9,598</td>
<td>2</td>
<td>7,777</td>
<td>1</td>
</tr>
<tr>
<td>Deposits</td>
<td>537</td>
<td>0</td>
<td>1,264</td>
<td>0</td>
<td>1,675</td>
<td>0</td>
<td>2,091</td>
<td>0</td>
<td>3,151</td>
<td>1</td>
</tr>
<tr>
<td>Other investments</td>
<td>8,643</td>
<td>2</td>
<td>10,442</td>
<td>2</td>
<td>12,113</td>
<td>3</td>
<td>12,931</td>
<td>2</td>
<td>19,352</td>
<td>3</td>
</tr>
<tr>
<td>Liquid assets</td>
<td>4,403</td>
<td>1</td>
<td>10,287</td>
<td>2</td>
<td>9,263</td>
<td>2</td>
<td>11,897</td>
<td>2</td>
<td>11,311</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>460,777</td>
<td></td>
<td>427,297</td>
<td></td>
<td>481,811</td>
<td></td>
<td>542,112</td>
<td></td>
<td>624,881</td>
<td></td>
</tr>
</tbody>
</table>

**Sources:** DNB data and authors’ calculations.
better manage the mismatch exposure that is exacerbated with the volatility of the new market-based discount rate. A December 2005 study of pension funds published by the DNB indicated that prior to the announcement of the proposed FTK in 2004, the average duration of pension funds fixed-income portfolios had been virtually constant at about five years. From the end of 2003 to the end of 2005 durations had increased substantially to more than six years. It is interesting to note however that this change was not uniform with some funds making very significant increase while others hardly changed at all, as evidenced by the dispersion around the averages. Ninety percent of the funds had durations between 3.7 and 5.6 years in 2003. By the end of 2005 this same range had increased to between 4.3 and 9 years, indicating that some proportion of pension funds had moved to durations nearing or exceeding the 12 to 15 years typical for the liabilities of pension funds, as indicated in figure 2.9.

In summary, the introduction of RBS in the Netherlands has imposed significant changes to the manner in which the review of the operation of the funds is undertaken and even more dramatic revision in the solvency standards. However, it has not yet resulted in any significant disruption of what remains perhaps the strongest DB system in the world today. This is likely to be a result of a variety of factors that lend stability to the system, including the quasi-mandatory nature of coverage in many industries, a long tradition of collective management and social risk-sharing, and the phased process of implementation that provided a number of years for consultations and included a variety of important

Figure 2.9. Distribution of the Duration of Fixed-Income Investments

![Distribution of the Duration of Fixed-Income Investments](image)

Source: Kakes and Broeders 2006.
adjustments and meaningful flexibility in standards to facilitate the transition. Although many of these important conditions are unique to the Dutch circumstances, the development of an approach that effectively treats pension funds as financial institutions supervised in a common regime with others by an integrated authority provides many useful lessons for others to follow, regardless of the divergence of conditions.

Notes

1. The replacement rate shows the ratio between the total retirement income and the income directly before retirement.

2. The definition of risk categories does not always comply with taxonomies generally used. The definitions have been chosen with full participation of the supervising employees to increase cooperation.

References

APP 1997

CBS (Centraal Bureau voor de Statistiek)


———. 2006c. Adviès Inzake.


CHAPTER 3

Risk-Based Supervision of Pension Institutions in Denmark

Rein van Dam and Erik Brink Andersen

Introduction

This chapter reviews the evolution of risk-based supervision (RBS) of pension institutions in Denmark. Over the past decade Denmark has been strengthening its regulatory framework and moving toward the development of RBS. Unlike some other countries, Denmark has not released a comprehensive model for assessing the risk of its pension funds; it has, however, developed a number of building blocks for a risk-based assessment of its pension entities. This move toward RBS has occurred at the same time that Denmark has relaxed its quantitative restrictions on pension fund investments. Although this relaxation has opened the way for increased financial returns, it has exposed pension institutions to greater volatility and potentially to greater risk of insolvency. Part of the supervisory response has been to introduce a traffic-light stress testing approach for assessing pension fund solvency. The supervisor uses this information, in conjunction with other qualitative measures, to determine a rating for each pension institution. The supervisor also uses these measures, particularly the stress tests, to guide the intensity and scope of activity.
The Danish Pension System

Description of the System

The Danish pension system is a multipillar system. The first pillar is an unfunded social pension scheme that pays a universal flat pension to people over age 65 subject to residency and employment earnings tests. The social pension is financed from general tax revenues. In addition to the flat universal pension, a supplement, also financed from general tax revenues, is paid to qualifying people subject to an income test.

The second pillar comprises occupational pension plans that are quasi-mandatory and nearly universal. Most have been established by collective labor agreements between employers and labor unions. These plans are managed by life insurance companies, multiemployer pension funds, and corporate pension funds, as well as banks. The vast majority of these operate as defined contribution (DC) plans. Benefits depend on the size of contributions and investment returns and can take the form of life annuities, phased withdrawals, and lump sum payments. Term life and disability insurance are also provided. A major exception to the prevalence of funded DC plans is the civil service pension scheme, which is an unfunded defined benefit (DB) plan that is covered from the central government’s budget.

The third pillar comprises voluntary personal pension plans offered by life insurance companies and banks. The latter are not permitted to offer insurance products, such as annuity contracts, but may only provide lump sums and phased withdrawals as pure savings vehicles; however, limited insurance cover may be obtained as an integral part of the product when a bank cooperates with an insurance company. Third pillar plans are motivated in part by tax considerations and appeal to people who are not covered by occupational pension plans.

In addition to these three pillars are a number of statutory supplementary schemes. The most important of these is the Labor Market Supplementary Pension (ATP), a mandatory public scheme based on individual accounts, fully funded, and financed by employer and employee contributions or by the government for unemployed workers and those on parental leave. Another two schemes are also mandatory and fully funded, while two additional schemes are voluntary and have much narrower scopes. Although established by law and considered public, these schemes follow pure return/risk trade-offs in their investment strategies.

Coverage of the three pillars is very high. It is universal in the public pillar, reaches 80 percent of the labor force under occupational plans.
(outside the mandated supplementary schemes), and is close to 40 percent in the third pillar. It is estimated that over 90 percent of wage earners participate in either a second- or third-pillar plan.

The aggregate assets of the three pension pillars at the end of 2004 amounted to DKr 1,822 billion (US$360 billion). This corresponded to 125 percent of gross domestic product (GDP), up from 83 percent in 1995 (table 3.1). The supplementary pension funds—ATP, the Special Savings Pension (SP), and the Lønmodtagernes Dyrtidsfond (LD), which is the fund that manages cost-of-living allowances for employees—accounted for 23 percent of total assets, while 77 percent belonged to second and third pillar institutions. The social pension scheme does not have accumulated assets.

Total contributions to the supplementary schemes and second and third pillar institutions amounted to DKr 90 billion (US$18 billion) in 2004 (table 3.2). This corresponded to 6.1 percent of GDP, up from 4.3 percent in 1995. Contributions to occupational pension plans constituted 70 percent of the total, and personal pension plans accounted for 22 percent. ATP contributions represented 8 percent of the total. SP contributions absorbed 10 percent in 2000 but were suspended in 2004. The share of occupational pension plans and of life insurance and multi-employer pension funds increased over time.

An important characteristic of the Danish pension system is the extensive use of guaranteed minimum benefits in the second and third pillars. Plans operated by insurance and pension companies offer both guaranteed minimum benefits and guaranteed annuity conversion factors in both the second and third pillars, but banks only offer guaranteed minimum investment returns since they are not allowed to offer annuities.

<table>
<thead>
<tr>
<th>Table 3.1. Pension Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Total pension assets (DKr billion)</td>
</tr>
<tr>
<td>Total pension assets/GDP (%)</td>
</tr>
<tr>
<td>ATP (% of total)</td>
</tr>
<tr>
<td>SP (% of total)</td>
</tr>
<tr>
<td>LD (% of total)</td>
</tr>
<tr>
<td>Life insurance companies (% of total)</td>
</tr>
<tr>
<td>Multi-Employer pension funds (% of total)</td>
</tr>
<tr>
<td>Corporate pension funds (% of total)</td>
</tr>
<tr>
<td>Banks (% of total)</td>
</tr>
</tbody>
</table>

Sources: Statistics Denmark and the Danish Financial Supervisory Authority (various years).
The offer of guaranteed benefits raises some crucial regulatory issues since the value of any guarantees depends on the solvency and integrity of the institution providing them. In Denmark there is no government guarantee fund to absorb the consequences for members of different pension plans in the event a pension institution becomes insolvent.

The Danish Financial Supervisory Authority (Finanstilsynet; DFSA), which regulates all types of financial institutions, is responsible for regulating and supervising pension institutions and ensuring that they are in sound financial condition to be able to honor their commitments. The DFSA is an institution under the responsibility of the Minister for Economic Affairs. However, the supervision of the various statutory supplementary pension schemes—ATP, SP, and LD—comes under the responsibility of the Minister of Labor.

The social pension scheme provides a universal benefit that aims to prevent poverty in old age. More than 700,000 people were recipients of the social pension in 2003. This corresponded to 13 percent of the total population or 25 percent of the labor force. The total cost of the social pension absorbed 4.4 percent of GDP in 2003, corresponding to 7.5 percent of total wages paid. The average benefit amounted to 30 percent of the average wage. However, these figures include the pension supplements paid to lower-income pensioners. The basic social pension, without any supplements, amounted to only 20 percent of the average wage.

Although there is no legal requirement that employers provide pension benefits to employees, most employers offer such benefits on the basis of collective labor agreements. Coverage expanded considerably in

### Table 3.2. Pension Contributions

<table>
<thead>
<tr>
<th></th>
<th>1995</th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (DKr billion)</td>
<td>44.02</td>
<td>70.91</td>
<td>89.53</td>
</tr>
<tr>
<td>GDP, % of GDP</td>
<td>4.3%</td>
<td>5.5%</td>
<td>6.1%</td>
</tr>
<tr>
<td>ATP (% of total)</td>
<td>10.5%</td>
<td>8.9%</td>
<td>7.5%</td>
</tr>
<tr>
<td>SP</td>
<td>9.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational pension plans</td>
<td>54.1%</td>
<td>58.6%</td>
<td>70.3%</td>
</tr>
<tr>
<td>L&amp;P institutions</td>
<td>46.4%</td>
<td>52.5%</td>
<td>62.5%</td>
</tr>
<tr>
<td>Banks</td>
<td>7.7%</td>
<td>6.1%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Personal pension plans</td>
<td>35.4%</td>
<td>22.9%</td>
<td>22.3%</td>
</tr>
<tr>
<td>L&amp;P institutions</td>
<td>14.4%</td>
<td>10.1%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Banks</td>
<td>20.9%</td>
<td>12.8%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Sources:** Statistics Denmark and the Danish Financial Supervisory Authority.
the late 1980s and early 1990s as a result of collective bargaining and government support through the offer of tax incentives. Coverage reaches almost 80 percent of wage earners.

The vast majority of occupational pension plans are DC plans, but they also offer death and disability benefits. However, probably because of the strong involvement of labor unions in the creation and expansion of these plans, most schemes offer guaranteed investment benefits and involve the use of group annuities.

Contributions to occupational pension plans increased steadily over the past 10 years from 2.36 percent in 1995 to 4.31 percent in 2004. This increase is due partly to expanding coverage and partly to a gradually rising contribution rate, which reached 11 percent in 2006 in labor agreements between the Danish Confederation of Trade Unions (LO) and the Danish Employers’ Confederation (DA) that cover half the labor force.

Three main types of institution participate in the second pillar. At the end of 2004, there were 44 corporate pension funds, 30 multi-employer industry-wide pension funds, and 37 life insurance companies. Banks play a small part in the second pillar. Despite the large number of participants, the sector is highly concentrated.

Corporate or single-employer pension funds cover the employees of single companies. These play a small and declining part. Many of them are closed to new members and even to new contributions. Multi-employer pension funds are created as member-owned mutual companies and cover industry-wide plans, for example, for nurses. Life insurance companies are the most important group of pension institutions. They are established either as shareholder-owned, joint-stock companies or as policyholder-owned, mutual companies. Insurance companies typically manage employer-specific plans, which are negotiated with the employers concerned and cover all people employed by them. Although they have different ownership structures, multi-employer pension funds and life insurance companies are subject to identical accounting, reporting, and other regulatory rules, and there is fierce competition among them.

In the case of occupational pension plans, 50 percent of contributions were allocated to annuities in 2004. The suballocation between life and term annuities is not known. However, the 2004 pattern represented a relative decline in the importance of annuities, which absorbed 60 percent of contributions in 1995. Allocations for phased withdrawals, which usually run for 10 years (they are not lifelong products), absorbed an increasing proportion of total contributions. They rose from 10 percent in 1995 to
35 percent of total contributions in 2004. In contrast, contributions allocated to lump-sum payments fell from 30 to 15 percent of the total. To a large extent this reflected changes in tax legislation in 1999 that limited the tax deductibility of contributions to lump sums up to a 43-percent marginal tax rate instead of the top marginal rate of 58 percent.

A relatively recent feature of the Danish pension industry are unit-linked contracts. The marketing of these contracts has been prompted by the reduction in guaranteed investment returns and a growing preference of plan members to invest in assets with varying risk/return profiles. However, at less than 9 percent of the total, the proportion of annual contributions that is allocated to unit-linked products is still small. Moreover, unit-linked products often involve some minimum guarantees, usually at a low level compared to traditional products.

A distinguishing feature of Danish pension plans is the offer of guaranteed minimum investment returns for both the accumulation and payout phases. The minimum guarantees are effectively embedded options that members and policy holders have the right to exercise if market rates fall below the guaranteed rates. Pension institutions create appropriate reserves to cover the guaranteed benefits and then distribute bonuses to members depending on the performance of their funds.

The interest rate used to calculate the value of guaranteed benefits was initially set at 4.5 percent per year. It was reduced to 2.5 percent in 1994 and to 1.5 percent in 1999. The new rates apply to new contracts. New contributions made to old contracts are subject to their original guaranteed rates. However, such contributions are not unlimited but are subject to rules specified in the relevant plans or contracts. The setting of guaranteed minimum returns has largely reflected movements in market rates, especially the yields on 10-year government bonds.

Personal pension plans constitute the third pillar of the Danish pension system. They are offered by banks and insurance companies and are established on a voluntary basis by persons who are not covered by occupational pension schemes or wish to obtain additional coverage. As in most countries, they benefit from tax advantages that emulate the fiscal tax benefits conferred on occupational pension schemes.

Banks play a bigger part in personal pension plans than in second-pillar plans, accounting for nearly 60 percent of total contributions. The relative greater success of banks in personal pension plans may be explained by their stronger presence in the retail financial services market and the preference of savers for greater flexibility. Only 15 percent of contributions are allocated to annuities. Unit-linked products (sometimes
guaranteed against negative returns) are growing but still constitute less than 10 percent of contributions.

Several statutory schemes have been created over time to supplement the benefits provided by the social pension scheme and/or to attain particular objectives of social and economic policy.

- The ATP was introduced in 1964 to supplement the social pension. Coverage of ATP increased rapidly over the years and is now near universal. Payments depend on the type of employment. Wages earners contribute one-third and employers two-thirds. Benefits are also subject to a low ceiling. Benefits take the form of annuities, calculated at an interest rate of 2 percent, but with the possibility of bonus payments from accumulated investment reserves. The limited role played by ATP is highlighted by the size of contributions and benefits relative to GDP. These respectively amounted to 0.45 and 0.33 percent of GDP in 2004. Total contributions are less than 0.8 percent of the wage bill. However, because of its universal coverage and long existence, the ATP has amassed large assets, amounting to DKK 307 billion (US$61 billion) in 2004. It is one of the largest financial institutions in Denmark.
- The LD scheme was introduced in 1977. Contributions to this scheme were paid into individual accounts as a trade-off for wage increases. The LD scheme has not received any contributions or new members since 1980.
- The SP scheme was introduced in 1998 with a view to dampening economic activity and increasing savings. Contributions to the SP have been suspended since 2004.

Pension institutions used to invest heavily in Danish bonds, especially Danish mortgage bonds that enjoyed a higher yield than government paper while being considered as highly safe. However, in the 1990s, following a liberalization of investment rules, pension institutions expanded their investments in equities, especially foreign equities. In 2000 the average asset allocation included nearly 40 percent in equities, while pension institutions with a high solvency ratio were allowed to increase their allocation to equities to up to 70 percent.

Following the collapse of equity prices between 2000 and 2002 as shown in table 3.3, the equity allocation was substantially reduced as shown in figure 3.1, both as a result of changes in relative prices (equity prices fell while bond prices rose in response to the substantial decline of interest rates) and as a result of portfolio reallocation strategies. Pension
Table 3.3. Investment Returns of Pension Institutions, 1999–2004

<table>
<thead>
<tr>
<th>€ billion or %</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on investment</td>
<td>16.6</td>
<td>6.6</td>
<td>–1.4</td>
<td>1.5</td>
<td>8.8</td>
<td>14.2</td>
</tr>
<tr>
<td>Result after tax</td>
<td>3.2</td>
<td>0.6</td>
<td>–2.1</td>
<td>–1.4</td>
<td>1.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Return on property</td>
<td>8.8%</td>
<td>8.1%</td>
<td>12.8%</td>
<td>12.1%</td>
<td>7.2%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Return on equities</td>
<td>40.1%</td>
<td>4.3%</td>
<td>–15.6%</td>
<td>–27.4%</td>
<td>20.9%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Return on bonds</td>
<td>1.7%</td>
<td>6.4%</td>
<td>6.9%</td>
<td>11.1%</td>
<td>5.3%</td>
<td>8.7%</td>
</tr>
<tr>
<td>Return on total assets</td>
<td>12.9%</td>
<td>5.7%</td>
<td>–1.6%</td>
<td>1.5%</td>
<td>7.8%</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

Sources: Danish Financial Supervisory Authority, Market Development for Insurance Companies and Pension Funds (various years).

Figure 3.1. Asset Allocation

Source: Danish Financial Supervisory Authority.

Institutions were required by the regulators to hedge their long-term risks; many proceeded to invest in derivatives, especially interest rate swaps, in order to hedge their liabilities against further declines in interest rates. At the end of 2004, 68 percent of total assets were invested in bonds, 20 percent in equities, 7.5 percent in real estate, and 4.5 percent in other assets.

Many of the larger pension institutions developed sophisticated internal asset management and risk control units. These set annual investment strategies and conduct detailed asset liability management (ALM) analyses. A growing number of pension institutions outsource their portfolio management to external asset managers, while small pension funds often
purchase group pension contracts; 14 percent of the multiemployer pension funds and almost 35 percent of company pension funds are fully reinsured with life insurance companies.

Tax factors have played an important role in stimulating the growth of pension saving. Employee contributions to an occupational pension scheme are deductible from taxable income, with some limitations for lump-sum contributions. Employer contributions are also tax deductible. The net tax subsidy in Denmark is around the average for Organisation for Economic Co-operation and Development (OECD) countries, but the high marginal income tax rate (up to 58 percent) provides a strong incentive for tax-deductible contributions.

The taxation of investment income has changed substantially over the years. When introduced in 1984, taxation was imposed on real returns above 3.5 percent earned on investments in bonds. This provided incentives for allocating assets into domestic equities and real estate, the returns on which were left untaxed.

The taxation of investment income was changed in 1998 when a tax of 26 percent was applied on all income from bonds and real estate, while investment income from equities was subject to a lower tax of only 5 percent. The tax system was streamlined in 2001 when all investment income, irrespective of type of asset, was made subject to a 15-percent tax.

**Risk Sharing**

As noted, a distinguishing feature of Danish pension plans is the offer of guaranteed minimum investment returns for both the accumulation and payout phases.

Pension contracts are for the most part based on profit participation policies. The guaranteed minimum returns are low relative to prevailing returns at the time the contracts are created. Total returns and pension benefits depend on the realization and distribution of bonuses during the life of the contracts, which often also cover the payout phase and not just the accumulation phase.

The distribution of bonuses is based on the so-called contribution principle to avoid unjustified and distorting transfers across different groups of members and between members of pension plans and the owners of the institutions managing the plans. The parameters of the contribution principle are set by each institution and reported to the DFSA, which has the power to review and disallow them if it finds them unfair or imprudent.

The return to capital normally consists of a return related to the investment result plus a fair risk premium. The fair risk premium compensates
shareholders for their exposure to loss. There is no standard methodology for calculating a fair risk premium, which remains the result of subjective evaluation. In strong financial years, life insurance companies that are set up as joint-stock companies can pay the owners a dividend for the current year plus any dividends not able to be paid in earlier, weak, financial years. Dividends not paid out in weak financial years will normally be accumulated in a shadow account. This is a controversial way of handling fair payment to capital. It is not seen in many companies outside the Danish pension sector (DFSA 2004a).

**Motivations for a Risk-Based Approach**

A number of factors prompted supervisors in Denmark to move toward a risk-based approach to supervision. Chief among these were problems within the financial sector and concerns about the solvency position of pension institutions.

**Insolvency and Rescue Operations in the 1990s**

In the early 1990s, the DFSA engaged in rescue operations for a number of banks involving the transfer of assets to stronger banks. Despite the avoidance of depositor losses, the DFSA was criticized for allowing such problems to develop. The DFSA recognized that the community expected that it not only to enforce legal compliance but also to take preventative action to prevent problems from emerging.

These considerations led to a growing emphasis on RBS as a means to ensure that financial institutions maintained capital and reserves that were commensurate with the risks they assumed. The risk-based approach was also promoted as a means for identifying individual institutions that were likely to face solvency problems.

The early use of a risk-based approach for pension institutions was encouraged by the fact that the DFSA combined supervision of all financial institutions, including banks and insurance companies.

**Growing Concerns about Future Solvency**

In 1984 the maximum technical discount rate was set at 4.5 percent, and most of the policies issued on the basis of the new mutual common calculations explicitly contained a guaranteed minimum nominal interest rate of 4.5 percent after tax. With a nominal interest rate level above 20 percent at that time, the market looked at the guaranteed interest as a technicality. It was effectively an option with no value as it was far out
of the money. Figure 3.2 shows that as market interest rates fell from their peak in 1994, the maximum discount rate, which also acted as the guaranteed minimum rate, was decreased to 2.5 percent in 1994 and 1.5 percent in 1999.

Although pension funds offer guaranteed rates of return, these rates have, with the exception of a brief period in the early 1990s, been well below market interest rates. However, the narrowing gap between guaranteed interest rates and markets rates in the late 1990s, and the fact that earlier guarantees must be honored, highlighted risks inherent in providing interest rate guarantees that were neither priced nor hedged.

The need to become more risk focused was underscored by the collapse of equity prices between 2000 and 2002 and the substantial fall in interest rates.

**Adaptation of Regulatory Framework**

Adaptation of the regulatory framework to the risk-based approach involved a gradual increase in the effectiveness of the powers of the supervisor and changes in the rules regarding the licensing, governance, financial management, disclosure, and supervision of pension institutions. The trend toward risk-based regulation and supervision started in the late 1980s with the creation of the DFSA and accelerated over the 1990s in response to the financial difficulties faced by banks and pension institutions.

![Figure 3.2. 10-Year Government Bond Yields and Guaranteed Interest Rates](image)
The Danish Financial Supervisory Authority
The DFSA is the main supervisor of the financial sector, including the pension sector. In its present form, the DFSA was established on January 1, 1988, with the merger of the Supervisory Authority for Banks and Savings Banks and the Insurance Supervisory Authority. In January 1990, the Supervisory Authority for Mortgage Credit Institutions was transferred from the Danish Housing Agency to the DFSA, creating an integrated supervisory authority for the entire financial sector.

The main objective of the DFSA is to maintain confidence in the stability and efficiency of the financial sector by regulation, supervision, and dissemination of information. Apart from the registration and review of the articles of association of new companies, which are carried out by the Danish Commerce and Companies Agency, the DFSA is responsible for supervising compliance of all financial institutions with the Financial Business Act and regulations pursuant to it.

The collection and dissemination of information plays a critical part in the operations of the DFSA. The DFSA uses the collected information to evaluate the financial strength and performance of individual institutions and to identify institutions that require close monitoring and early remedial action. Published information aims to support management, clients, and investors in evaluating the risk profile and efficiency of each financial institution.

The structure of the DFSA is outlined in figure 3.3. It is accountable to the Minister of Economic Affairs, who has overall political responsibility in matters relating to the financial sector. The DFSA is supported in its activities by three councils: the Financial Business Council, the Danish Pension Market Council, and the Danish Securities Council.

The DFSA has a four-member management board, 14 divisions, and a number of special counselors. The director general, who is in charge of the work of the management team and is responsible to ministers and councils, holds the overall responsibility for strategic planning and resource allocation.

Regulatory Techniques and Supervision has 130 staff members representing about 70 percent of total resources as shown in figure 3.4. Within this area 14 staff members are employed in the Life and Pension Insurance Division. They take part in supervisory work, such as offsite surveillance (desk research) and onsite inspections. They are also involved in several supervisory research activities. In the development of the traffic-light stress test, the Life and Pension Insurance Division was supported by other divisions, including the Banking Division with its superior expertise in this area.
Figure 3.3. Regulatory Structure

Source: Danish Financial Supervisory Authority.

Figure 3.4. Staff of the Danish FSA (full-time employees)

Source: Danish Financial Supervisory Authority.

a. estimated.
The Credit and Market Risk Division informs pension supervisors on the evaluation of credit and market risks, and the Mortgage Credit Division informs them about real estate risks. The Insurance Mediators and Consumers Division is responsible for supervising the fitness and probity of the boards of directors and management of pension institutions.

Internal procedures of the supervisor have been formalized through the development of supervision manuals and written internal procedures related to the most important legal tasks. The procedures for the application of the traffic-light system have also been stipulated in detail in internal manuals. The traffic-light system is seen as the starting point of important discussions on risks instead of a rigid capital adequacy test.

The DFSA budget is covered by fees from regulated entities based both on gross premiums and member contributions, and on the size of the balance sheet less base capital. The budget of the DFSA amounted in 2004 to about €18 million; 18 percent was contributed by pension institutions, 49 percent by banks, and the rest by other financial institutions.

**Licensing and Authorization Criteria**

All financial institutions are required to obtain an authorization from the DFSA according to current European Union (EU) directives. An application must be accompanied by various documents, including a memorandum of association and a business plan. The technical basis or framework for setting premiums, provisioning, and profit sharing for insurance must be added if the application is for a life insurance and pension license. The supervisor may refuse to approve the technical basis.

The application must specify the types of pension products the applicant intends to offer; the basis for calculating and adjusting pension contributions, benefits, and technical provisions; the rules for the distribution of profits, losses, and administration costs; the policy on reinsurance; the rules on the information that members must provide for an assessment of risks; the rules on transfers of accounts and policies; and the rules that apply in cases of transfer of ownership or reorganization of an undertaking.

Appointment of members of the board of directors and the board of management is subject to a fit-and-proper test.

**Governance Rules and Internal Controls**

A range of conduct of business rules designed to avoid conflicts of interest and ensure appropriate governance arrangements is prescribed in the Financial Business Act. The DFSA supplements these rules with guidelines for insurance and pension entities. In the guideline for insurance
companies (DFSA 2005), the DFSA requires that policies must reflect the risk profile and capital strength of the entity. The guideline is in accordance with standards prepared by the International Association of Insurance Supervisors (IAIS).

Among other things the standard operating procedures and the internal controls of the pension institution must ensure sufficient segregation of the duties of personnel and that the undertaking does not become too dependent on individual key persons. If complete segregation of duties is not possible, this must be taken into account in the preparation of guidelines and procedures and the planning of internal controls.

The board of directors must prepare written guidelines on the most significant areas of activity of the pension institution, specifying the division of responsibilities between the board of directors and the board of management. The guidelines should include a description of the pension institution’s risk profile. The board needs to issue instructions setting out limits for risk taking that enable the organization to implement the policies.

A pension institution is required, at a minimum, to prepare guidelines that contain information about the following: the insurance function; the types of insurance that may be written, acceptance rules, and tariffs; the reinsurance cover including choice of reinsurance and requirements; investment policies and objectives; registration of assets; and information and communication to customers.

Reporting to the board of directors must include all the areas for which limits for the board of management have been stipulated or where legislation stipulates limits.

The board of directors must establish targets and standards of reference for the purpose of assessment of results achieved, including the returns obtained. It must also carry out an annual review of the principles for the measurement and valuation of assets and of the risk situation of the insurance function with a view to assessing the need for amended guidelines for risk assumption, adaptation of tariffs, or provision principles.

If the assets of the pension institution are managed by portfolio managers, it is the responsibility of the board of directors to ensure that funds are invested within the guidelines and in accordance with the Financial Business Act, and that reporting procedures are adequate and suitable for complying with the guidelines and the law.

**Actuarial and Auditing Rules**
The Financial Business Act specifies the requirements for a responsible actuary, who must ensure that the pension institution complies with
requirements for calculating the fund’s contributions, benefits, and reserves (its technical basis). The responsible actuary is required to notify the DFSA immediately of any disregard of these conditions.

The DFSA has established more detailed provisions in an executive order (DFSA 2002) on the conditions that a person must fulfill to be employed as the responsible actuary regarding education and operational experience.

Although not required under the under the Financial Business Act, the regulator expects large pension funds to have an internal audit function. In addition, all pension institutions must also have at least one external auditor who is a state-authorized public accountant. The auditor is required to comment on the adequacy of provisions and risk management procedures.

External auditors and chief internal auditors are required to notify the DFSA of any matters of material importance for the continued operation of the pension institution, including matters that may be observed by the auditors while performing their audit in undertakings with which the pension institution is closely linked.

The DFSA is empowered to order auditors to cover specific areas for individual companies or for the pension sector and to request meetings with auditors. The DFSA also has the power to dismiss the auditors, although it has yet to exercise this right. The DFSA has laid down additional provisions on audit proceedings.

**Capital Rules**
The Danish solvency rules are similar to the regulations of the European Life Assurance Directive (European Parliament and Council 2002), which has not yet imposed risk-based capital requirements. The DFSA imposes some additional rules related to the traffic-light system.

**Technical Provisions and Valuation Rules**
Pension institutions must create sufficient technical provisions, including mathematical provisions, with respect to their entire business. The technical rules for the valuation of assets and liabilities, the recognition of revenues and expenses, and the calculation of technical provisions are covered by DFSA guidelines.

In accordance with the European Life Assurance Directive, technical provisions must be calculated through a sufficiently prudent and prospective actuarial valuation, taking into account all future liabilities, as determined by the policy conditions, for each existing contract and scheme.
These provisions should include all guaranteed benefits, including surrender values; all collective and individual bonuses to which policyholders are entitled; all options available to policyholders under the terms of their contracts; all expenses, including commissions; and credits for future premiums due.

In Danish practice the technical pension provisions are divided into three components: guaranteed pension and insurance benefits, bonus potential related to future premiums, and bonus potential related to benefits on paid premiums.

**Investment Regulations**

Pension institutions in Denmark are subject to some quantitative restrictions on their investments. Since 2000 greater investment freedom has been permitted in conjunction with the introduction of the traffic-light system, a stress test for a fair assessment of the solvency of the companies and a tool for intervening as early as possible if the solvency of a company is in danger because of a high-risk profile. Thus, while the quantitative approach has been retained in form, because it is more in line with the approach followed by the European Life Assurance Directive, in substance the regulation of investment policies has been moved in the direction of the prudent-person rule prevalent in Anglo-American countries.

**Distribution Rules**

A distinguishing feature of the Danish pension system is the widespread use of profit participation policies and the offer of guaranteed minimum investment returns for both the accumulation and payout phases. The guaranteed minimum returns are low relative to prevailing returns at the time the contracts are created; accordingly, total returns and pension benefits depend on the realization and distribution of bonuses during the life of the contracts. The rules for the distribution of bonuses play a central part in the functioning of the system.

Risk-sharing schemes help institutions cope with volatility and solvency problems, but they could result in substantial, unintended, and unfair income transfers across different groups of policyholders and between policyholders as a group and the owners of the institutions managing the plans. To avoid such unjustified and distorting transfers, the authorities have required pension institutions to stipulate their distribution principles in their contracts with customers. The so-called contribution principle reflects the opinion of the DFSA. The distribution parameters are set
by each institution and reported and justified to the DFSA, which has the power to review and disallow them if it finds them unfair or imprudent.

The contribution principle consists of two elements. The first element—the calculated contribution principle—relates to the distribution between the owners of the company and the policyholders as a group. The owners have contributed with their own funds, which may be shareholder capital or so-called special bonus provisions. The special bonus provisions are policyholder funds that under certain requirements fulfill the role of capital covering the solvency margin. Consequently, the owners are entitled to a share of income corresponding to the capital they have invested.

Income is not divided proportionally between the amounts “invested” by policyholders and shareholders. It is accepted that there is an added markup to the part allocated to shareholders as a payment for the risk taken by share capital. Some distributions to owner funds are only permitted if sufficient surpluses are available. Payments may be deferred until results permit. Thus, in strong financial years, pension institutions that are set up as joint-stock companies can, in addition to the yearly dividend, pay the owners a dividend compensating for “shortfalls” in earlier, weaker financial years.

The measurement principle used for assets is crucial for the determination of the realized result. The use of fair values means that all value changes on assets are reflected in the realized result and must be divided between policyholders and owners. There are no hidden values serving to cushion the volatility of financial markets in the accounts and in the realized results.

The second element—the distributed contribution principle—entitles policyholders to a share of the income generated that corresponds to the premiums they have paid and the accumulated interest and bonuses added to the premiums in the course of the contracts. However, policyholders have different contracts with different terms. The amounts allocated to individual policyholders do not necessarily correspond exactly to the amounts relating to individual contracts; rather, they reflect the different risks associated with specific types of contracts. In relation to the distributed contribution principle, the executive order implies that “redistribution of significant financial amounts shall not take place between insurance contracts, beyond the amounts following from the coverage of risks included in the insurance contracts” DFSA 2004a: section 5[3]). The companies have discretion regarding the timing of the allocation to individual contracts. They can retain the bonuses to a certain extent for
prudential reasons, but this prudential consideration should be balanced with the principle that bonuses should be released to individual policyholders in the course of the contract in a way that ensures a fair distribution among policyholders with different characteristics.

The allocation of bonuses to policyholders follows the rules set for the creation of technical provisions. When the provisions for guaranteed benefits, bonus potential for future premiums, and bonus potential for paid premiums have been set, any remaining allocation to policyholders is posted on the collective bonus potential.

When results in a particular year are negative, the deficit that is attributed to policyholders is covered in reverse order. If the negative results cannot be covered by deductions from these provisions or from the company’s own funds and special bonus provisions, the responsible actuary must immediately notify the DFSA.

**Disclosure Rules**

To enhance transparency and facilitate more informed decisions, pension institutions are required to disclose in their annual accounts key figures and ratios regarding investment returns, costs, risks, and capital strength. In addition, the DFSA publishes on its Web site key performance indicators of individual institutions as well as of the two subsectors of life insurance companies and multiemployer pension funds.

**Off-site Analysis and On-site Inspections**

The DFSA conducts regular off-site examinations of the financial data submitted by regulated institutions and reviews the results of their operations. Pension institutions must provide the DFSA with all necessary information for the performance of its duties. Nearly all financial information is made available in electronic form. The DFSA is entitled to gain access to the premises of pension institutions at any time without warrant in order to conduct inspections or gather information, although a three-week notice is given under normal circumstances.

Pension institutions must publish an annual report comprising a management endorsement, balance sheet, income statement, notes including a description of accounting policies and movements in own funds, management review, and finally auditors’ opinion. All assets and liabilities must be measured at fair value.

The annual report must be audited by the external auditors and submitted to the DFSA no later than four months after the end of the accounting year. The audit books from the external auditor and from the
chief internal auditor (for pension institutions with internal auditors) must be submitted to the DFSA at the same time as the annual report.

The DFSA may lay down regulations on the preparation and publication of interim statements covering shorter periods than the annual report. At present, every institution is required to submit semiannual unaudited reports. However, the majority of pension institutions issue quarterly performance reports on a voluntary basis.

A member of the board of directors, board of management, external auditor, or responsible actuary of a company who has cause to believe that the pension company does not comply with the capital requirement must immediately notify the supervisor. External auditors and chief internal auditors must also immediately notify the DFSA of matters of importance to the continued operation of the undertaking, including matters that may be observed by the auditors while performing their audit in entities with which the pension institution is closely linked.

Regular on-site inspections normally include meetings with senior management, the responsible actuary, the head of investments, the head of information technology systems, and internal and external auditors. As on-site inspections are relatively more expensive and resource intensive compared to off-site analysis, inspections are primarily conducted in cases where it is difficult to prepare or evaluate reports—or when there is doubt as to the reliability of a report.

However, smaller companies are subject to regular on-site inspections at least once every seven years and larger companies at least once every four years. For companies in the green traffic-light zone, the frequency of off-site inspections within these time limits is based on the opinion of the supervisor of the importance and probability of qualitative risks in the relevant institution. However, when the traffic-light system shows a red or yellow light the institutions concerned will be visited more frequently.

The DFSA may gain access to the premises of an institution at all times with a view to obtaining information, including during inspections. The DFSA may ask for any information, including accounts, accounting records, printouts of books, other business records, and electronically stored data deemed necessary for its activities or for deciding whether a natural or legal person is covered by the statutory provisions.

The DFSA may order the management of an institution to prepare an account of the financial circumstances and future prospects of the undertaking. The board of directors, board of management, the responsible actuary, the external auditor, and the chief internal auditor are
required to sign the order to confirm that they have been made aware of
the contents of the DFSA order issued.

Pension institutions are required to submit all the necessary data for
assessing their financial resilience in accordance with the traffic-light sys-
tem. They are also required to report on a regular semiannual basis the
results of internally conducted stress tests.

**Enforcement**

In the event of poor management of the board or noncompliance with
the law, several sanctions can be used. The most powerful sanctions are
replacement of the management board and withdrawal of authorization;
fines are possible. In gross or repeated offences, the cases are be reported
to the police. The most important sanctions include the following:

- The DFSA may order a company not to accept, or to remove, a mem-
  ber of the board of management within a specified time limit, if the
  member does not meet the fit and proper test.
- The DFSA is empowered to order the pension institution to carry out
  the necessary changes in the conditions within a specified time limit,
  if the technical basis of premiums, provisions, and profit-sharing prin-
  ciples is deemed inadequate.
- The DFSA may order a pension institution to take all the necessary
  measures within a specified limited time frame if its financial position
  has deteriorated to such a degree that the interests of pensioners and
  other insured parties are at risk, or if there is a significant risk that the
  financial position will develop so that the institution may lose its license.
  If the base capital is not sufficient, the DFSA will require the institu-
  tion to draw up a plan for restoration of its financial position. The
  DFSA will assess whether the plan contains the necessary measures.

Pension institutions must carry out annual reviews of their pension
rules and technical basis and must inform the DFSA of whether changes
are required when they submit their annual financial statement. If the
DFSA finds that changes are required, it shall ensure that the company
carries out adjustments.

Violation of several provisions of the Financial Business Act may result
in to a fine. In some circumstances imprisonment of no more than four
months is an alternative.

Where a company or a responsible person within the company fails to
fulfill the duties and obligations imposed under the act (such as failing to
give information), the DFSA may, as a coercive measure, impose daily or weekly fines on the responsible person or on the pension institution.

The DFSA may withdraw the license of a pension institution fully or partly under the following conditions: if the institution is guilty of gross or repeated violations of provisions laid down in the Financial Business Act; if it no longer fulfills the conditions for a license; if it does not, within the time limits set by the DFSA, carry out the measures listed in the restoration plan; if its management fails the fit-and-proper test; if it commits other serious or repeated offenses; or the pension institution itself requests it.

The Financial Business Act also contains special regulations regarding the appointment of administrators in the case of bankruptcy or where pensioners are deemed at risk. Decisions made by the DFSA may be appealed to the Danish Commerce and Companies Appeal Board.

**Implementation of Risk-Based Supervision**

Denmark is an EU member, and its legislation for solvency, accounting, and freedom of services across borders follows the EU directives. However, as a general principle, EU directives set minimum rules but leave ample room for detailed provisions to be determined by national authorities.

The regulation of life insurance companies and pension funds is based on the European Life Assurance Directives. The solvency rules stipulated by the directive are not yet risk based. On the asset side, quantitative limits apply. There are restrictions on the proportion of assets that may be placed in higher risk assets, notably equities. Moreover, quantitative limits are applied to the possible exposure to one issuer of securities or to the proportion of total assets that may be invested in one company or a group of closely related companies. These rules aim at limiting an imprudent concentration of risks. However, the solvency rules do not take into account the level of risk of different assets. Thus, institutions with substantially different risk profiles are subject to the same solvency requirement.

The Danish authorities have been taking various steps to gradually move in the direction of a risk-based approach to the regulation and supervision of pension institutions. This move has been accompanied by a loosening of some regulations and a view that the greater flexibility given to pension entities could increase their risk profile.

**Relaxation of Investment Limits**

In 2000 the limits for investment in equity was raised from 50 percent to 70 percent. This increase was accompanied by a requirement that the
The proportion of higher risk assets in a portfolio be assessed against objective criteria based upon an assessment of the company’s actual capital strength measured against its risks on investments and commitments.

The flexibility in the current investment regulations is so great that asset allocation strategies are more influenced by internal asset/liability considerations and capital rules (like the traffic-light system) than by investment rules and limitations per se.

**Gradual Adoption of Fair-Value Accounting Rules for Assets**

Fair-value accounting has been introduced gradually since 1995. Since 2003 all assets of pension institutions must be measured and reported at fair values with value changes—realized and unrealized—shown in the profit-and-loss account.

**Adoption of Fair-Value Accounting Rules for Liabilities**

The Danish authorities established in 1998 a special market-value committee to propose a suitable model for the valuation of insurance and pension liabilities. The committee included representatives from the DFSA, which held the chairmanship, the life insurance industry, and the actuarial and accounting professions. The committee reached a consensus on a valuation model that was based on the decomposition of technical provisions and the ultimate adoption of the yield curve of appropriate zero-coupon instruments.

**Decomposition of Technical Provisions**

The decomposition of technical provisions reflects two important aspects of the Danish pension market: the offer of guaranteed minimum returns on both past and future contributions, and the presence of contracts with substantially different guaranteed rates. The new rules on the setting up of technical provisions require pension institutions to use three different components of technical provisions for each generation of contracts.

- The *guaranteed benefits* measure the difference between the present market value of the guaranteed benefits according to the terms of the insurance contract and the present market value of the future premiums to be paid.
- The *bonus potential on future premiums* measures the present market value of the excess return over the guaranteed benefits that will arise from the future premiums. This bonus potential is calculated as the
difference between the market value of the guaranteed benefits on premiums paid and the market value of the guaranteed benefits. If this difference turns out to be negative, it is set at zero.

- The bonus potential on premiums paid measures the market value of the excess return over the guaranteed benefits that arise on premiums already paid. This bonus potential is calculated as the difference between the technical provisions and the guaranteed benefits on paid up premiums. If this difference turns out to be negative, it is set at zero.

The sum of guaranteed benefits, bonus potential on future premiums, and bonus potential on paid premiums constitutes the technical provisions, which form the base for calculating the solvency requirement. Pension institutions also set aside under the contribution principle that governs their with-profits policies a collective bonus, which represents the value of bonuses allocated to policyholders as a group but not yet allocated to individual policyholders. The collective bonus is not a part of the technical provisions and is not taken into account in the computation of the solvency margin.

When measuring the components of technical provisions, the accounting rules state that assumptions must be based on the best estimate of relevant underwriting risks, administration costs, and an appropriate discount rate with the use of a risk margin. Hence, technical liabilities must be reported at their best estimate. The DFSA does not stipulate general actuarial assumptions. Pension institutions must base measurement of their liabilities on their best estimates, taking into account any future projected developments.

One important assumption when measuring technical liabilities is the assumption about mortality. The DFSA does not stipulate the use of a specific mortality table. Each pension institution must base its liabilities on its own best estimates on future mortality and longevity; however, the best estimate assumption is subject to review by the supervisor.

**Adoption of Zero-Coupon Yield Curve**

Since January 2005 the DFSA has been publishing on a daily basis a yield curve of euro swap rates to use in valuing the present value of cash flows. During a long transition period, pension institutions will continue to have the option to use either a flat rate or the yield curve; however, beginning in 2009, use of the yield curve will be compulsory.
The Traffic Light System

The traffic-light system was introduced by the DFSA in 2001. The aim was to ensure that companies hold sufficient reserves to cover possible adverse market developments. The requirements were imposed on all life insurance companies and pension funds, not only those exceeding the former quantitative limit of 50 percent on the share of higher risk assets.

The stress test is divided into two scenarios: yellow test and red test. When a company does not fall into one of these two categories, it is deemed to be in a green-light situation as its capital base is adequate when measured against its potential to absorb losses from possible adverse market developments.

Both tests measure the capital strength against possible scenarios that have not occurred at the time the stress is performed. Measurement and reporting is done on a semi-annual basis. The yellow scenario is possible, but less likely; the red scenario is more likely, although still only a plausible scenario. The colors indicate that it is a serious matter if the plausible scenario poses capital problems (red light), whereas it is a less serious problem if the less likely scenario poses capital problems (yellow light).

The stress test is composed of a number of assumed market developments outlined below.

Asset Risks

In determining asset risks, the tests break the asset portfolio into a number of broad risk classifications including the risks arising from changes in interest rates on debt instruments, changes in equity and real estate prices, credit risk, and currency risks. A separate methodology is then applied to each of these asset classes.

Debt instruments—The effect of interest rate movements is calculated through the impact on the market value of interest bearing receivables arising from changes in the interest rates (from both increasing and falling interest rates). The assumed interest rate changes, which vary according to the modified duration of the instrument, are shown in table 3.4. Entities have to report changes in the value of nominal bonds, indexed bonds, mortgage and commercial bonds, and derivatives.

Equity and real estate risks—In the red test, equity prices are assumed to fall by 12 percent. This is the same rate used for the banking sector under the capital framework known as Basel I for banks for calculating capital requirements. In the yellow test, equity prices fall by 30 percent,
a rate of decrease long used by insurance actuaries in many countries. Real estate properties are measured at market value according to accounting standards. In the red test, real estate market values are assumed to fall by 8 percent and in the yellow test by 12 percent.

**Credit Risk**

The credit risk is measured by applying credit risk weights to the different categories of bonds. Government bonds are assigned a weight of zero; Supra and agency bonds are assigned weights between 0.10 and 0.01563, depending on class and duration. Corporate bonds are assigned a weight of one. The same weights are used for both the red and yellow scenarios. The total credit risk is calculated as 8 percent of the weighted amount.

It is important to note that the credit risk on corporate and mortgage bonds does not yet take into account the risk of default as reflected in different credit ratings. As the traffic-light system evolves toward a full application of risk-based rules, the applied risk weights will need to reflect the investment grade of corporate and mortgage bonds.

**Counterpart Risks on Derivatives**

The counterpart risks on derivatives are calculated by using the market value multiplied by a weight depending on the type and duration of contracts and by a factor that depends on the credit risk classification of the security issuer.

**Risks in Subsidiary Companies**

Risks in subsidiary companies are calculated using the same procedures as used for the parent company.

**Currency Risks**

All uncovered positions in foreign currencies are measured with value at risk (VaR) on a 99 percent level for the red test and 99.5 percent for the yellow test.
**Liability Risks**

Liabilities are treated differently from the assets. The discount rate is assumed only to move in parallel shifts, where the rate used is the zero coupon rate from the euro swap curve. Since short rates are more volatile than long rates, this approach does not take into account the higher volatility of liabilities of short duration. The change in the interest rate in the red test is up/down 0.7 percentage points and in the yellow test up/down 1.0 percentage point. However, a nonparallel shift will be applied on a voluntary basis after July 2006 and will become mandatory from 2009.

The risks in liabilities are shown as changes in the various components of the technical provisions before and after stress testing. Calculations are made for each of the components of the technical provisions: guaranteed benefits, bonus potential on paid-up premiums, and bonus potential on future premiums.

**Concluding Report**

The total impact of the stress tests is obtained by taking into account the worst result from either an increase or decrease in stress parameters in the red and yellow tests. The impact on the capital base of pension institutions is calculated after allowing for the distribution of risks (losses) between policyholders and owners in accordance with the contribution principle. The conclusion on the impact of the stress test is reported on a semi-annual basis to the supervisor. This report shows the impact on the capital base and solvency margin of the pension institutions for each scenario.

The required solvency margin is based on the European Life Assurance Directives, which include a solvency margin of 4 percent of assets for the investment risks borne by pension institutions. As the investment risk is explicitly addressed in stress tests, the required solvency margin is reduced by adding back 3 percent of technical provisions; this amount is the difference between 4 percent required when the investment risk is borne by the pension institution and 1 percent when it is not, as is the case for unit-linked business. The allocation of losses to the collective bonus and the bonus potential on paid premiums then is calculated according to the terms of the underlying contracts before obtaining the net risk-adjusted solvency ratio.

After receiving the final report from the pension institutions, the DFSA takes into account further information on qualitative risks as well as longevity risk in order to develop a more comprehensive picture of the situation of each pension institution.
Internal Risk Control and Market Discipline

In addition to the use of the traffic-light system, there has been a growing emphasis on the adequacy of internal risk control systems such as the new capital adequacy framework for insurance being developed in Europe (Solvency II) and greater reliance on market discipline. These do not represent specific initiatives of the DFSA but reflect a growing trend in most developed countries. Nevertheless, they play a central part in the evolving risk-based approach to supervision as they address qualitative risks that are difficult to quantify, while also allowing a swifter retribution by market participants on institutions that fail to maintain adequate standards.

The importance attached to internal risk control systems and market discipline reflects the evolution of thinking on banking supervision under the revised Basel II capital adequacy framework. The DFSA has focused a substantial part of its supervisory effort in assessing the qualitative risks faced by pension institutions. This assessment covers the adequacy of internal risk control systems, the presence of staff with the requisite expertise, and the institution of procedures for proper reporting to the highest levels of management. The DFSA has an internal rating system for each pension institution. However, there is no formal requirement for pension institutions to appoint a chief risk officer reporting to the chief executive office and the board. Qualitative risks also cover exposure to operational, information technology, legal, integrity, and even underwriting risks, all of which are not quantified either under the current solvency regime or the traffic-light system. A failure in any of these areas has often been the proximate cause of collapse and insolvency of financial institutions.

The DFSA pays particular attention to the development of internal risk models that allow pension institutions to determine their risk exposures and measure the impact of changes in financial market conditions on their capital and solvency. It has also developed three internal quality scores on organization, procedures, and internal controls, as well as a rating on insurance risks, which mainly covers the longevity risk exposure of different institutions. The insurance risk is determined by considering a 1 percent increase in longevity. These qualitative scores are added to the quantitative scores resulting from the stress tests of the traffic-light system.

The DFSA is also attaching significant importance to greater publication of data on the financial performance and standing of pension institutions. Greater disclosure is expected to strengthen market discipline. Public disclosure of risks, costs, and returns is likely to enhance efficiency by allowing investors, policyholders, and other market participants,
including competing institutions, to make better informed decisions on their transactions with individual pension institutions.

**Changes in DFSA Procedures and Skills**

The introduction of fair-value accounting and the traffic-light system was not only challenging for the industry but also for DFSA. Monitoring the actuarial and auditing reports of pension institutions during off-site surveillance has become more important because of the traffic-light system. The compilation of more detailed data by pension institutions has alleviated the data collection effort that the DFSA needed to undertake in the past. On the other hand, greater importance needs to be attached to educating DFSA staff members in understanding the models used by pension institutions, drawing appropriate inferences from the submitted data regarding the risk exposure and solvency of individual institutions, and determining any remedial actions that DFSA needs to undertake.

The focus of on-site inspections has also changed. Greater emphasis is now placed on verifying that adequate internal risk control systems and standard operating procedures are in place rather than on verifying compliance with specific DFSA rules. Although the introduction of the traffic-light system has not required an increase in the number and frequency of on-site inspections, the results of stress tests have guided the intensity and scope of these inspections.

During the last few years, great effort has been devoted to enhancing the education of DFSA staff. An internal supervision school has been created to deepen knowledge of fair value accounting and the traffic-light system and, even more important, to change the attitude of staff from assessing compliance with regulatory rules to recognizing and acting on foreseeable risks.

Staff incentives have also been changed. Job rotation, especially between the banking and the insurance and pension divisions, is encouraged, while bonuses for senior management depend, among other factors, on the progress in implementing RBS. DFSA staff members are part of the public sector, which creates problems in attracting able and experienced professionals. The intensive internal training effort aims to complement the external hiring initiatives.

Remedial actions depend on the results of the traffic-light system, off-site analysis, and on-site inspections. If a pension institution passes all tests, it is given a green light under the traffic-light system, which implies that the risk of insolvency and withdrawal of authorization is very low. This institution then is subject to regular monitoring, semiannual submission
of the stress test, and other statistical reports. On-site inspections are carried out on a regular basis or at random to keep the institution alert.

Failure to meet the yellow scenario is treated as an early warning indicator. An institution that receives a yellow light is placed under intensified supervision, with quarterly stress test and other reports and more frequent and intensive on-site inspections. The DFSA may also order an extraordinary audit. The primary goal of intensified supervision is to increase the risk awareness of the management of the pension institution concerned.

An institution that receives a red light may be subjected to more drastic intervention. The DFSA may order the institution concerned to take the measures necessary within a specified time limit if its financial position has deteriorated to such a degree that it puts the interests of policyholders and other affected parties—the depositors, the insured parties, the bond owners, the investment associations, the special-purpose associations, the restricted associations, other collective investment schemes, or other investors—at risk. Direct intervention may also be necessary if the institution is close to losing its license.

A red light from a stress test does not necessary imply that the institution will immediately be subject to crisis management. The DFSA is aware that the standard red light is too simple to reflect fully and unambiguously the resilience of an individual institution to possible future risks. This is why the institution is always given the opportunity to argue its case to the DFSA that the red light does not reflect its actual financial condition. However, if the DFSA decides that the interests of all interested parties are seriously at risk, it will take appropriate and necessary action.

The DFSA will normally require monthly reporting from the institution as well as an undertaking that it will not increase its overall risk exposure. Often, the DFSA will demand a reduction in risks if the institution remains in the red-light situation for a prolonged period. Measures to reduce risks or risk exposures are not specified in detail. It is left to the management of the institution to decide on the most suitable actions. However, action plans prepared by the concerned institution must be submitted to the DFSA to enable an assessment of their appropriateness.

The most serious cases, when immediate action is required, are those where pension institutions fail to meet the formal solvency requirement that is based on European legislation. This is informally known as the “black light.” If an institution does not comply with the formal solvency requirement, formal action based on the Financial Business Act has to be taken.
The act states that if a pension institution does not comply with the solvency rules, the DFSA must ask the institution to draw up a plan to restore its financial position and assesses the adequacy of the plan. The DFSA decides the maximum period for the restoration of the financial position, depending on the size of the shortfall and anticipated market developments. The DFSA is expected to monitor the performance of the operating plan and demand changes in the plan if the financial position of the institution suffers further deterioration. The DFSA may also require a new operating plan to be submitted covering the following three accounting years. However, if the base capital of the pension institution is less than one-third of the solvency requirement or is less than the minimum capital requirement, the period for restoration of capital will be stated in terms of months and will not normally exceed one year. The capital shortfall may be covered by reserves of different types of bonuses and the base capital. The institution may also decide to increase member contributions or attract new external shareholder capital.

Changes in the Behavior of Pension Institutions

The gradual introduction of RBS induced various changes in the behavior and management practices of pension institutions. However, these changes also represented a necessary response by pension institutions to wide-ranging market developments.

Soon after the introduction of stress testing, financial markets were hit by severe turmoil. There was a global collapse of equity prices following the bursting of the dotcom bubble and a simultaneous dramatic fall in interest rates. Pension institutions suffered huge losses on their equity portfolios, while the present value of technical provisions increased dramatically. In addition, pension institutions were exposed to asymmetric effects of options that were embedded in their balance sheets. A very high proportion of contracts contained guarantees of high returns, both for past and future contributions, that must be honored.

The mismatch between assets and liabilities was aggravated by the presence of large investments in mortgage bonds that enjoyed embedded call options. As borrowers exercised their options to refinance their mortgages with lower mortgage rates, pension institutions did not experience an increase in the market value of their bond holdings. In this situation, a large number of institutions found themselves in the yellow light status under the new traffic-light system, while some were even in the red light status. For a few companies the situation turned out to be so severe that they encountered real problems in fulfilling
their solvency requirements and they were placed under special supervision by the authorities.

Pension institutions reacted to the financial crisis and the new stress testing by reducing their equity portfolios (in large part caused by the very fall of equity prices); selling short-duration bonds and buying long-duration ones, especially foreign bonds; and engaging in extensive hedging operations, mostly through the use of long-term interest rate swaps in the more liquid euro market. Although such policies ran the risk of locking in the losses, it was generally accepted that pension institutions could not afford to suffer additional losses and endanger their financial solvency.

Although detailed data were not available to estimate the price effect and separate it from the asset allocation effect, published data support the argument that ATP has engaged in a significant switch away from domestic and foreign equities and domestic bonds and in favor of foreign bonds and derivatives. If there was no quantity effect but only a price effect, the share of equities should have recovered between 2002 and 2004. Table 3.5 shows that for the ATP, the share of equities fell from 40 percent in 1999 to 22 percent in 2002 and continued to fall to less than 18 percent in 2004.

Table 3.6 shows that for life insurance companies and multiemployer pension funds (L&P), the decline in equity holdings starts from a lower base and is not as great, but is still quite clear. Holdings of domestic bonds fluctuated from year to year, but there was a large increase in holdings of foreign bonds. Holdings of both domestic and foreign equities fell sharply and rose very slightly with the recovery of equity markets in 2003 and 2004, implying a quantity effect was in place and not just a price effect.

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic bonds</th>
<th>Foreign bonds</th>
<th>Fixed-income derivatives</th>
<th>Domestic equities</th>
<th>Foreign equities</th>
<th>Investment trusts</th>
<th>Other assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>55.0</td>
<td>2.4</td>
<td>0.0</td>
<td>25.2</td>
<td>10.7</td>
<td>1.2</td>
<td>5.5</td>
</tr>
<tr>
<td>1999</td>
<td>47.7</td>
<td>3.7</td>
<td>0.0</td>
<td>24.8</td>
<td>15.3</td>
<td>3.3</td>
<td>5.3</td>
</tr>
<tr>
<td>2000</td>
<td>39.8</td>
<td>9.7</td>
<td>0.0</td>
<td>21.1</td>
<td>16.4</td>
<td>6.9</td>
<td>6.1</td>
</tr>
<tr>
<td>2001</td>
<td>29.1</td>
<td>16.5</td>
<td>0.0</td>
<td>16.8</td>
<td>19.0</td>
<td>12.5</td>
<td>6.1</td>
</tr>
<tr>
<td>2002</td>
<td>32.8</td>
<td>27.6</td>
<td>5.3</td>
<td>11.6</td>
<td>9.2</td>
<td>6.0</td>
<td>7.5</td>
</tr>
<tr>
<td>2003</td>
<td>29.6</td>
<td>35.1</td>
<td>4.2</td>
<td>11.2</td>
<td>8.6</td>
<td>4.2</td>
<td>7.2</td>
</tr>
<tr>
<td>2004</td>
<td>26.1</td>
<td>32.2</td>
<td>10.2</td>
<td>9.6</td>
<td>7.9</td>
<td>7.1</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Sources: Danish Financial Supervisory Authority and ATP.
However, L&P institutions invested less heavily in equities before 2000 and the impact is smaller. A switch away from equities is also discernible.\(^2\)

The evolution of the asset composition of pension institutions is also shown in figure 3.5. The supervisory authorities intervened to force remedial action in institutions that were in a red-light situation, but refrained from influencing management decisions and forcing asset sales in all other institutions.

The growing use of derivatives and the changes in asset allocation strategies improved the interest sensitivity of the total portfolio. Table 3.7 shows that in 2001 and 2002 an interest rate fall of 1 percentage point
produced a net loss of more than DKr 15 billion (US$3 billion). This was transformed into a net gain of DKr 15 billion in 2003 and DKr 8 billion in 2004.

Other important changes cover developments in product pricing and product innovation. In a market environment that is dominated by with-profits policies, changes in product pricing involve changes in the distribution of profits. Until recently, most institutions set the rate of profit distribution to clients one year ahead. This rate was an important competitive parameter among pension institutions. However, after the financial turmoil, many institutions introduced a variable rate of profit distribution that depended on investment performance during the year. Although this more flexible approach made it easier for institutions to meet their obligations, the coupling of the approach with the substantial reduction in guaranteed rates of return created considerable uncertainty in the eyes of policyholders.

Client response to the increased uncertainty stimulated the introduction of unit-linked and other products that were offered without any guarantees or with reduced levels of guarantee. Unit-linked products were accompanied by increased transparency in the distribution of profits between owners and policyholders. In some cases, pension institutions introduced products with highly transparent distribution policies that were based on predetermined and clearly postulated formulas.

**Preliminary Assessment of Risk-Based Supervision**

The development of RBS in Denmark is still in its early stages. Despite this, it is possible to come to some broad conclusions about the impact that the move to RBS is having on pension institutions and identify remaining challenges that lie ahead.
Positive Achievements

A fundamental aspect of the Danish experience is the large expansion of pension coverage and the vast accumulation of pension assets that occurred since the mid-1990s. Over 90 percent of Danish workers participate in either an occupational or personal pension plan, while the total assets of pension institutions reached 125 percent of GDP in 2004.

In this context of market success, one of the most important achievements of the supervisory authorities has been the broad acceptance of a risk-based approach to the regulation and supervision of life insurance companies and pension funds. This has been facilitated by the prevalence of with-profits policies with guaranteed minimum investment returns and the pressure faced by all types of pension institutions arising from long decline of interest rates since the early 1990s and the sudden global collapse of equity prices between 2000 and 2002.

A second and equally important achievement has been the gradual reorientation of the DFSA. Benefiting from its extensive involvement in banking supervision issues, the DFSA has been able to shift from a preoccupation with compliance with rules to a focus on solvency assessment, identification of asset/liability mismatches, and management of risk exposures.

A third achievement has been the use of pragmatic interventions. The DFSA issued instructions and orders to individual institutions to take necessary remedial action, but it refrained from forcing them to sell specific assets. It engaged in extensive consultations with the concerned institutions, but it allowed their management to determine their own action plans. The DFSA reviewed these plans to verify their adequacy and monitored their implementation to ensure that corrective measures were effective.

The DFSA played a leading part in the introduction of fair-value accounting, working jointly with industry representatives to analyze the issues and reach consensus on the changes that were deemed necessary. Fair-value accounting was introduced in stages, leaving ample room and time for pension institutions to adapt their procedures and train their staff. This gradualism was another example of pragmatic response to market challenges.

In similar vein, the adoption of a zero-coupon yield curve for discounting future pension liabilities followed close collaboration with industry representatives and allowed individual institutions to comply with the new approach within a reasonable time frame.
The traffic-light system was implemented cautiously, although in this case it could have benefited from more extensive consultation with market participants and experts. The traffic-light system could have been adapted more effectively to the particularities of the pension business; however, allowing for the possibility of further improvements and refinements, it was implemented without causing excessive disruption to the operations of pension institutions. The need to take prompt action explains to a large extent the limited extent of consultation.

The growing emphasis on internal risk control systems, enhanced transparency, and greater market discipline has increased risk awareness by pension institutions while placing responsibility for effective risk management firmly on the boards of directors and boards of management of individual institutions. The rapid development of highly sophisticated internal risk control systems by the larger pension institutions and their use for detailed model simulations lend support to the benefits of this approach.

Pension institutions now have greater awareness of the risks embedded in their contracts and are more knowledgeable on how to minimize these risks. They are as a sector less exposed to adverse developments in financial markets and also are better able to adjust to market changes. Their customers are also better informed since pension institutions are now required to make public their sensitivity to major adverse market changes.

Finally, a major achievement has been the gradual change in reserving and investment practices of pension institutions. The new risk management systems have allowed institutions to adopt a better matching of their assets and liabilities, including their exposure to embedded options. Growing use of various types of derivatives, including long-term interest swaps, swaptions (options to enter into swap contracts), and constant maturity swap floors as well as equity options and futures, has allowed individual institutions to deal effectively with long-standing embedded options that had created asymmetric exposures and interest rate sensitivities.

Remaining Challenges

Despite the many positive achievements, several challenges remain. The first such challenge is the need for further streamlining of the traffic-light system. Various technical improvements have already been suggested. They include introduction of a correlation matrix among asset classes; differentiation of risk rating within specific asset classes (for example, between mature and emerging markets, between large and small capitalization issues, between high- and low-credit rating bonds, and between listed and unlisted securities); equalization of the stress test parameters of interest rate
risk between assets (which are already duration dependent) and liabilities (which are not yet duration dependent); and introduction of sensitivity to underwriting risks, especially longevity and disability risks. Some of these measures have been implemented since July 2006, while the sensitivity of underwriting risks is reported to the DFSA as supplemental information.

Another challenge concerns the clarification of the legal content of contract guarantees. One of the practical consequences of fair-value accounting of assets and liabilities has been that embedded options in pension contracts, such as interest rate guarantees, are now defined in a more precise way. In the past it was not always clear whether the interest rate guarantee applied to an annual minimum yield or to a minimum average yield over the life span of the contract. In fact, some cases in relation to this issue are currently disputed in Danish courts. The legal outcome of this issue will have important ramifications for the pension industry. New contracts contain more-precisely defined terms on guarantees and embedded options, while the distinction between unconditional provisions and bonus potential has also become clearer.

Another issue is the addition of a fair margin for risk and uncertainty to the computation of future cash flows. In the past, a small deduction was applied to the flat discount rate, but in the future a risk margin would be added directly on the estimated cash flows. The risk margin could vary among individual institutions, reflecting the nature and structure of their future liabilities.

However, apart from the above important refinements to the traffic-light system, Denmark (in line with other EU countries) needs to adapt the legal framework to introduce proper risk-based capital requirements. This is the object of the Solvency II deliberations that have been ongoing for a number of years. Adoption of risk-based capital requirements (expected in 2010) will remove the existing uncertainty regarding the legal force of RBS, but it is unlikely that it will fundamentally change the current approach of the Danish supervisory authorities.

Following the publication of a report by a government-appointed committee on the merits of greater freedom of choice in pension saving and investment, a working party was created with representatives from the DFSA, the Danish Insurance Association (DIA), and the Ministry of Economics to consider the introduction of risk-adjusted solvency requirements (RASR) and individual capital assessment (ICA). The report has not been published yet, but negotiations and discussions between the DFSA and the DIA on the introduction of RASR and ICA are underway.
Another important challenge is the need for broad dissemination of analytical data that will permit a more comprehensive and systematic analysis of the performance of pension institutions both on sector and individual bases. While consumers and workers may find it difficult to utilize the plethora of available data and effectively scrutinize institutional performance, specialized experts can undertake such detailed analyses and publish summaries of the performance of different institutions and products in terms of overall investment returns, operating costs, distribution of bonuses, solvency soundness, and other characteristics. Availability of detailed data would permit indepth econometric and financial studies of the efficiency, soundness, and fairness of the pension industry as a whole.

At present, claims are often made that fierce competition among pension institutions stimulates innovation and efficiency. However, retail markets are not responsive to even large differences in performance. Simple reliance on abstract claims about the intensity of competition is not sufficient to buttress the view that the pension system meets the fundamental challenges of efficiency, stability, and fairness. Claims on performance and efficiency need to be supported by rigorous empirical studies and financial investigations by independent specialists.

Notes

1. The response of pension institutions to the financial turmoil and the growing use of derivatives are analyzed in some detail in Ladekarl and others (2007).
2. Investment trusts invest in both equities and bonds. Other assets include buildings, subsidiaries, and loans.

References


CHAPTER 4

Risk-Based Supervision of Pension Funds in Australia

Graeme Thompson

Introduction

Australia’s framework for prudential regulation of pension (or superannuation) funds originated in the early 1990s when the central government introduced a near-universal system of compulsory employer contributions. The supervisory framework relied heavily on the prudent-person approach, deriving from the fiduciary duties of the trustees who managed both employer and employee contributions in trust fund structures. This approach was consistent with the broad deregulatory philosophy that prevailed in Australia from the mid-1980s when interest rate and exchange rate controls were largely removed along with quantitative restrictions on banks’ asset portfolios. No restrictions were imposed on superannuation funds’ investment composition other than rules to prevent borrowing by superannuation funds and the misuse of funds by employers.

There were several thousand supervised funds, including retail funds, industry funds associated with labor unions, and funds sponsored by single-employer companies. As a result of this industry structure and the limited supply of regulatory resources, prudential regulation was risk-based from the beginning in the sense that it sought to identify and focus more
attention on the higher risk funds. This approach guided the allocation of the regulator’s time and effort.

Identification of high-risk funds relied on offsite analysis of statistical and other information submitted, external audit and actuarial reports, and onsite supervisory reviews. In addition, certain categories of funds received closer attention than others. Retail funds—which tended to be bigger than other types and whose boards of trustees did not include employee representatives—were subject to licensing conditions and more onerous ongoing attestation requirements. All large funds were required to submit statistical information more frequently than small funds. Regulators also conducted onsite reviews of large funds more frequently.

The regulatory framework has evolved a good deal over the past decade, and refinements continue to be made. This evolution has been shaped by experience, by changes in industry structure and practice, and by regulatory reorganization. Its main objectives have been to develop more sophisticated advance indicators of risk and to give regulators the resources necessary to interpret those indicators and act preemptively and effectively.

Basic reliance on the prudent-person philosophy has been retained, but regulation now describes in much more detail what a prudent-person approach to managing superannuation contributions means in practice. This chapter summarizes this evolution in Australia’s regulatory framework and describes the present system.

Pension System

Australia’s arrangements to provide postretirement income for its workforce has three pillars:

- a means-tested indexed pension paid by the central government and funded from general taxation revenue
- compulsory employer contributions to superannuation funds that finance pensions or lump-sum payments on employees’ retirement; this component has been significant only since 1992
- voluntary private savings, including employer and employee contributions to superannuation funds.

The government-funded pension under the first pillar remains a major source of retirement income, with approximately 54 percent of individuals of qualifying age—65 years for men and 63 for women (this latter
will increase to 65 years by 2014)—receiving a full pension and another 28 percent receiving a partial pension. The full pension is maintained at one-fourth of the average wage. The relative importance of the pension will decline gradually as the second retirement income pillar matures. However, the aging of the population means that the annual cost of the government pension will still rise as a proportion of gross domestic product (GDP) from its present level of around 3 percent.

The second pillar is comprised the superannuation guarantee (SG), under which employers are required to contribute a percentage of their employees’ wages and salaries to a superannuation fund. The only exceptions are for employees earning very low amounts, part-time employees under 18 years of age, and employees age 70 and over. Approximately 90 percent of Australia’s 12 million workers are members of a superannuation scheme.

The SG percentage commenced at 4 percent (3 percent for small employers) in 1992 and increased progressively until reaching its present level of 9 percent in 2002. The SG system has been one reason for the strong trend toward defined contribution (DC) funds over the past decade. However, employer contributions to defined benefit (DB) funds established before 1992 count toward an employer’s SG obligations and must meet the minimum 9 percent requirement.

Employer SG contributions are fully vested and must be preserved until retirement on or after age 55, a minimum age that will be increased gradually to age 60 in 2025. With some exceptions, fund members are able to transfer their benefits between funds when they change employment; this applies both to DC funds and to fully funded DB schemes (where a lump-sum equivalent to the vested pension benefit is determined and paid). Commencing in mid-2005, the rights of many employees to choose their fund at any time were extended.

The government’s objectives with pillar two were to augment private savings so that they would supplement the age pension as a source of retirement income, thereby reducing the pressure on budget funding that otherwise would grow rapidly as the average age of the population increased.

The third pillar of Australia’s income retirement arrangements—voluntary saving—is encouraged by various taxation concessions. These have resulted in rapid growth over the past decade in self-managed superannuation funds by the self-employed, proprietors of small businesses, and others with the time and financial acumen to manage their own investments.

Statistics do not differentiate between contributions and assets invested under the second and third pillars. Nor is the distinction between the
second and third pillars important for the prudential regulator, the Australian Prudential Regulation Authority (APRA). APRA supervises the bulk of the superannuation industry, and its prudential responsibilities are the same whether contributions are made voluntarily or under second-pillar compulsion.

The value of assets in superannuation funds of all kinds at the end of 2005 was just under $A850 billion (US$765 billion). This has increased strongly in real terms over the past decade and a half, having been a little over $A100 billion (US$90 billion) at the beginning of the 1990s. As an indicator of the social and economic importance of the industry, total funds invested now constitute about 45 percent of Australian households’ stock of financial assets; they exceed Australia’s 2005 gross domestic product of just under $A820 billion (US$738 billion).

Of funds with more than four members in 2005, some 50 percent of assets was in accumulation, or DC, funds; another 47 percent was in funds offering a combination of accumulation and DB. Only 3 percent was in pure DB funds, compared with 22 percent 10 years earlier. While the importance of DB funds has declined sharply in the past decade, the reported assets of DB funds understate the present value of their future payment obligations because some large public-sector schemes are not fully funded.

Most superannuation assets are managed under trust arrangements that separate the legal and beneficial ownership of assets. The trustee legally owns the assets of the trust but is required by law to manage them in the interests of the persons nominated in the legal instrument, most commonly a trust deed that establishes the trust.

Although the funds have a common basic legal structure, it is useful to classify them into a small number of distinct governance types. Retail, or public offer, funds offer superannuation investments to the general public, including employers not wanting to establish occupational funds. The trustee is a corporation with a board of directors and is often associated with an insurance company or bank. Retail funds constitute 32 percent of industry assets.

Industry funds draw membership from a defined industry segment (such as construction, retail, or hospitality) and are generally associated with trade unions that have negotiated compulsory membership with employers. The relevant employers and unions must appoint equal numbers of trustees. In 2005 these funds held 16 percent of industry assets. Corporate funds held 7 percent of industry assets. These funds are established by an individual employer for its employees; the employer and employees each appoint half
the members of the trustee board in accordance with the concept of equal representation. Public sector funds, which hold 17 percent of assets, are run by the central and state governments for their employees. “Small funds” are defined as those with fewer than five members; in these funds the members and trustees are identical and there is no need for prudential regulation. However, members who do not wish to operate these funds may appoint an APRA-regulated corporate trustee. There are approximately 320,000 such funds, with 23 percent of industry assets; most are regulated by the Australian Taxation Office, with APRA having responsibility for only about 6,700.

Leaving aside the small funds, there is considerable dispersion in the average size of funds, with the corporate funds generally much smaller than the others. Table 4.1 summarizes the current structure of the industry.

All classes of funds other than small funds have been consolidating for some time. Corporate funds have been declining particularly rapidly in both number and share of industry assets as costs of administration increase and the early-1990s introduction of near-universal employer superannuation eroded any competitive benefits from offering inhouse superannuation. This trend has been given substantial new impetus recently by the introduction of more stringent prudential regulations, including those for fund governance and risk management, and the requirement that all funds be licensed by the middle of 2006. As a result, the number of funds, excluding small funds, at the end of June 2006 was 872, less than half that of two years earlier.

A new classification of investments was introduced for 2005 and shows the following distribution: Australian equities (33 percent), international equities (23 percent), Australian fixed interest (13 percent), international fixed interest (5 percent), listed and unlisted property (8 percent), cash (7 percent), and other (10 percent).

### Table 4.1. Superannuation Funds: Type, Number and Size, December 2005

<table>
<thead>
<tr>
<th>Fund type</th>
<th>Number of funds</th>
<th>Total assets (SAb)</th>
<th>Average assets (SAm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>194</td>
<td>272</td>
<td>1,402</td>
</tr>
<tr>
<td>Industry</td>
<td>86</td>
<td>137</td>
<td>1,593</td>
</tr>
<tr>
<td>Corporate</td>
<td>681</td>
<td>56</td>
<td>82</td>
</tr>
<tr>
<td>Public sector</td>
<td>43</td>
<td>142</td>
<td>3,302</td>
</tr>
<tr>
<td>Small funds</td>
<td>319,492</td>
<td>194</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>127</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>320,623</td>
<td>845</td>
<td></td>
</tr>
</tbody>
</table>

*Source: APRA 2006.*
Table 4.2 shows that there has been a trend toward investment in equities and overseas investments at the expense of domestic fixed-interest securities. Forces driving this have included the move of Australia’s central government budget into surplus, the growth of the equity market—and its strength over the past few years compared with many other equity markets—and the use by trustees of more sophisticated investment managers.

Outsourcing is a common and growing feature of the industry, encompassing fund administration, asset custodianship, and investment advice and management. In 2005, excluding the small funds, 74 percent of funds used an external administrator (compared with 67 percent in 2002), 38 percent used an external investment manager (30 percent), and 29 percent used a custodian (12 percent).

Another increasingly common feature of the industry is the availability of choice of asset portfolio to members within a fund. About two-fifths of funds (excluding small funds) offer choices to their members. In 2005 retail funds offered an average of 59 options, industry funds offered an average of seven options, public sector funds offered six, and corporate funds four options.

The multiplicity and diversity of funds has created significant challenges for the regulatory system and necessarily influenced its approach. Supervision has also had to take account of the prevalence of outsourcing to third parties, a consequence of the small size of many funds. On the other hand, the supervisory system has benefited from the relative sophistication of Australia’s financial system, with strong standards of corporate regulation and accounting and well-developed financial markets.

Table 4.2. Superannuation Funds: Asset Allocation

<table>
<thead>
<tr>
<th>Asset class</th>
<th>2004</th>
<th>2000</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and deposits</td>
<td>8.3</td>
<td>6.5</td>
<td>6.8</td>
</tr>
<tr>
<td>Loans and placements</td>
<td>3.6</td>
<td>4.9</td>
<td>4.4</td>
</tr>
<tr>
<td>Interest-bearing securities</td>
<td>16.0</td>
<td>18.5</td>
<td>25.3</td>
</tr>
<tr>
<td>Equities and units in trusts</td>
<td>48.5</td>
<td>43.1</td>
<td>38.5</td>
</tr>
<tr>
<td>Land and buildings</td>
<td>5.2</td>
<td>5.3</td>
<td>6.9</td>
</tr>
<tr>
<td>Other domestic assets</td>
<td>1.8</td>
<td>2.7</td>
<td>4.1</td>
</tr>
<tr>
<td>Total domestic</td>
<td>83.3</td>
<td>80.9</td>
<td>86.1</td>
</tr>
<tr>
<td>Assets overseas</td>
<td>16.7</td>
<td>19.1</td>
<td>13.9</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: APRA.
Prudential Regulation in the 1990s

Prudential supervision of Australian pension funds effectively commenced in 1993 following the introduction of the mandatory SG arrangements. The 1993 regime emphasized the fiduciary responsibilities of trustees for the prudent management of funds and deemed these to be included in the governing rules of each fund. The statutory requirements in the Superannuation Industry (Supervision) Act 1993, section 52(2a, b, and c) included the following:

- act honestly in all matters concerning the entity
- exercise, in relation to all matters affecting the entity, the same degree of care, skill, and diligence that an ordinarily prudent person would exercise in dealing with another’s property for which the person felt responsible
- ensure that the trustee’s duties and powers are performed and exercised in the best interest of the beneficiaries.

The legislation buttressed these principles with specific prescriptions aimed at reducing the risk of superannuation investments, as well as dealing with retirement incomes policy (for example, vesting, preservation, and prompt payment), equitable treatment of members, financial accounts, information disclosure, and other matters. Statutory requirements with a prudential object included that funds should use the investments in their care solely to meet retirement incomes and should not borrow or give charge over assets. Others dealt with the conduct of trustee boards, including the requirement for equal employee and employer representation on employer-sponsored and industry funds.

Restrictions on investments aimed to prevent the gross misuse of funds. These restrictions included prohibitions on trustees or investment managers lending money to (or acquiring assets from) members, or making loans to (or investing in) employer-sponsors beyond a specified limit, as well as a requirement that all investments be made on arm’s-length terms. Where the trustee appointed an investment manager, it had to ensure that it received adequate information about investments and their performance.

Beyond that, in relation to investment, the legislation contained only a general requirement that trustees formulate and give effect to an investment strategy that took into account risk and return, diversification, liquidity, and the ability of the entity to discharge its existing and
prospective liabilities under the Superannuation Industry (Supervision) Act 1993, Section 52(2f).

The regulator, at that time the Insurance and Superannuation Commission (ISC), supplemented this legislative requirement with a guidance circular that emphasized the need for trustees to have a well-articulated and documented investment strategy. There was no prescription for particular investment classes and no quantitative requirements relating to investment earnings. In the mid-1990s, amid general concern about the growth in derivatives markets, the ISC required that funds with derivatives exposures have a risk management statement that explained and limited such exposures. This policy did not restrict the use of derivatives, except to forbid their use for speculative purposes.

From 1997 the ISC required the approved trustees of public offer funds to submit to it a prudential management certificate. This certificate includes an attestation of the following:

- The board is aware of its responsibilities for prudent management.
- The board and management have assessed the risks that could arise and have systems in place to manage those risks and to comply with their statutory responsibilities.
- Procedures are in place to monitor the appropriateness and adequacy of business systems and are operating effectively.

External auditors of funds also had a prudential role. After 1995, in addition to reporting in the usual way on funds’ financial accounts, auditors were required to conduct an audit on each fund’s compliance with the conduct provisions in the legislation. (This did not extend to the general investment provision described above.) The auditor was required to advise the trustees of any likely contraventions of the legislation or if, in its opinion, the financial position of the fund was, or might become, unsatisfactory. Only if trustees did not address such concerns adequately did the auditor need to inform the regulator.

As noted, only trustees of public offer funds were subject to regulatory approval before accepting superannuation contributions, and only they were required to observe a minimum capital requirement to absorb operational losses.

Trustees of DB funds were required to commission an actuarial valuation every three years and to comply with resulting recommendations on the adequacy of the fund’s resources to meet its liabilities. Subsequently the regulator was empowered to mandate more frequent actuarial valuations.
where it was concerned about a fund’s financial strength. Actuaries had similar whistle-blowing obligations as those of auditors. Other regulatory tools used by the ISC included desk reviews and onsite visits and an array of enforcement powers.

Under this regulatory regime of the 1990s the incidence of serious problems with pension funds proved to be very low. However, the absence of entry tests for major segments of the industry, the large number of funds (relative to the regulator’s resources), and the inadequacy of statistical data for risk assessment made effective oversight problematic. This was particularly so with small- to medium-sized funds, many of which demonstrated lack of financial sophistication and a poor understanding of trustee responsibilities.

**Evolution of Risk-Based Regulation**

The primary drivers for more sophisticated RBS and the significant enhancements have been emerged recently.

**Drivers for Change**

Drivers of the evolution in regulation have included the following:

- change in the organization of regulatory agencies
- continuing attempts to resolve the mismatch between the large number of superannuation funds and the limited supply of supervisory resources
- a small number of failures among funds
- regulatory concern about incomplete compliance with conduct rules and poor governance practices, particularly among small- and medium-sized funds.

**Organizational change**—Reorganization of Australia’s regulatory agencies involved the creation of APRA in 1998, and followed recommendations of the Financial System Inquiry (also known as the “Wallis committee” after its chairman) that an incoming government established in 1996. The reorganization—which brought together supervision of banks, life insurers, general insurers, and most of the superannuation sector—provided the opportunity to apply supervision techniques developed in one sector across the whole financial system.

Other regulators with interests in superannuation are the Australian Taxation Office, which regulates the great majority of small, self-managed funds that do not warrant prudential regulation, and the Australian
Investments and Securities Commission (ASIC), which is responsible for disclosure to members, market conduct, and the Superannuation Complaints Tribunal as the forum for member complaints.

**Resources**—The Wallis committee expected the creation of APRA to reduce the cost of prudential regulation. APRA’s steps to unify employment conditions across the staff members inherited from the predecessor agencies and to relocate all policy and research functions to the one center—along with attempts to achieve the cost reductions expected by the Wallis committee and government—meant that the number of regulatory staff members declined. In mid-2000 APRA had total staff of 400, compared with approximately 550 engaged in prudential regulation before 1998. In time, this reduction made even more obvious than previously the mismatch among the numbers of superannuation funds, the tools available for effective RBS, and the resources devoted to the task.

**Fund failures**—A third influence on supervisory evolution was the investment losses that emerged around 2000 in small funds administered by two approved trustees. Although these losses—which amounted to some $A35 million (US$32 million) and were due to the failure of speculative commercial investments—were tiny relative to the total superannuation sector, their impact on many of the affected individual beneficiaries was severe. There was a strong community and government view that the regulatory system should have prevented—or at least mitigated—the losses of these fund members.

In the larger of the two failures, evidence indicated fraudulent conduct and misrepresentation by trustees, and eventually investors were compensated under an industry-funded scheme designed for such situations. However, investigations by the Senate Select Committee on Superannuation found that a more aggressive regulatory approach could have reduced the losses (Senate Select Committee 2001). In particular, the committee called for APRA to look more closely at the investment strategies adopted by trustees and pursue signs of problems earlier and more vigorously.

In the same time period as these episodes, a large APRA-regulated general insurance company (HIH Insurance) failed and prominent non-financial corporations collapsed in Australia and the United States.

**Framework weaknesses**—This background provided fertile ground when in 2001 APRA first proposed a significant strengthening of the
RBS framework for superannuation. Its proposals drew on lessons from the two trustee failures and on accumulating experience of a widespread poor compliance culture among small- and medium-sized funds.

APRA had become increasingly concerned about inadequate standards of trusteeship, particularly in corporate funds where abuses of the “inhouse assets” (these include loans to or investments in a related party of the fund) and arm’s-length investment requirements were not uncommon. Other problems included poor understanding by some trustees of the rudiments of risk management; associated with that was excessive reliance on third-party service providers. APRA was also not satisfied with the poor quality and timeliness of information provided by funds, particularly given the importance of such information when resource constraints made frequent onsite inspections impossible. These concerns were outlined in APRA’s 1999 annual report (APRA 1999). In 2001 APRA focused on investment strategies that did not appear to have been designed in the best interests of fund members (APRA 2001).

APRA regulators also questioned why key features of the standard banking/insurance supervisory model should not be adapted for use with superannuation. Such features include universal licensing to control entry to the industry more effectively, a more prescriptive approach to the minimum acceptable features of risk management systems, and the application of prudential standards on the fitness and propriety of industry participants and on outsourcing then under development for the other sectors. APRA’s post-1999 organizational structure that eschewed specialist industry divisions encouraged such questioning.

**Superannuation inquiry 2002**—Late in 2001 the government commissioned a report from a superannuation working group (SWG) on improving the safety of superannuation. The working group was chaired by a nonexecutive member of APRA’s board; its report, completed late in 2002, concluded that it was an opportune time to review the existing prudential regulatory framework from a preventative-maintenance perspective.

The working group’s recommendations were mostly adopted by the government and, when carried into legislation, became the basis for reforms recently introduced by APRA.

The revised supervisory framework strengthens APRA’s powers over entry (licensing) and the fitness and propriety of persons in the industry, spells out in more detail what APRA expects in risk management plans and the resources available to funds, and introduces tougher attestation and whistleblowing rules. APRA also updated its
statistical reporting framework to provide more powerful data for making risk assessments.

**Strengthening the Risk-Based Policy Framework**

The main elements of the revised framework discussed below were introduced in 2004–06.

**Licensing and registration**—All trustees must now be licensed by APRA, and all superannuation funds with a licensed trustee must be registered. Previously, APRA licensed only trustees of public offer funds as “approved trustees.”

Licenses are available to trustee corporations or, where the trustee board consists of individuals, to groups of individual trustees. There are two main classes of license: public offer and nonpublic offer. Applicants for the former have to meet the capital requirements.

The universal licensing regime brings superannuation funds into line with all other regulated financial institutions and permits APRA to identify—and to bar—problematic trustees before they have accepted any investments.

**Fitness and propriety standard**—Trustees need to satisfy tests of both fitness and propriety at licensing and to meet these on an ongoing basis. This extends the previous provisions whereby APRA could disqualify or remove individual trustees on grounds of misconduct or certain criminal convictions and bankruptcy, or if they had been associated with breaches of superannuation law or were otherwise deemed to be unfit.

APRA does not mandate any minimum requirements for skill, education, or experience. However, trustees must possess a basic understanding of investments and be aware of key regulatory requirements, including their duties and responsibilities as trustees. They must also develop their own policies on acceptable standards of fitness and propriety, taking account of the size and complexity of their operations. The policies should provide for training of trustees to ensure their knowledge is up-to-date and also to explain how a trustee board will manage conflicts of interest.

**Risk management standard**—Under this standard, licensees must have policies and procedures at both trustee and individual fund levels to identify, measure, monitor, and manage all material risks. These policies and procedures, which are submitted to APRA, must be supported by a formal methodology and be clearly documented.
APRA’s guidance note on risk management advises trustees to use a well-structured process to identify and assess risks, possibly using a facilitated risk workshop. A checklist approach may be sufficient for the least complex funds, provided the trustees could demonstrate that they had covered the field adequately. However, the use of more advanced techniques is recommended.

APRA will need to be satisfied with risk management plans before granting a license. Licensees must subsequently ensure that their plans are up-to-date and are reviewed at least annually; APRA must be notified of material changes. Licensees must also notify APRA of any breaches; it is an offense not to report a breach. The external auditors of funds must audit their risk management strategies and plans annually and attest to APRA that these have been implemented and are working effectively.

These requirements for risk management plans replace, and substantially expand, the previous provisions for a prudential management certificate (that applied to approved trustees of public offer funds only) and for risk management statements in relation to the use of financial derivatives.

**Outsourcing standard**—Outsourcing is widespread in the superannuation industry and can be a significant source of risk. The purpose of the outsourcing standard is not to restrict trustees’ use of service providers—predominantly administrators, investment managers, and custodians—but to ensure that all material outsourcing arrangements are covered by robust and enforceable agreements.

Licensees must have procedures to select and monitor the performance of service providers. Termination and default provisions must allow for cancellation of a contract without prejudicing the interests of fund members. In addition, service agreements with related entities, including employer sponsors, must be on arm’s-length terms. Service agreements must also provide that APRA may have access to documents and the premises of the service provider and may request an audit of the provider.

**Trustee resources standard**—This standard specifies that trustees must have adequate resources—financial, technical, and human—to manage members’ funds prudently. It recognizes that benchmarks for adequacy will vary from fund to fund and will depend importantly on the extent of outsourcing.

Where trustees’ expenses are met from fees or from earnings, the trustees must prepare operating budgets to demonstrate that they will
remain solvent and have sufficient liquidity to meet payments. Where expenses are met by an employer, APRA will take into account the likelihood of the employer’s continuing support. Demonstrating sufficiency of resources will also require appropriate disaster recovery and business continuity plans. Where functions are outsourced, trustees will need to assess the adequacy of the service provider’s resources, including for disaster recovery and business continuity.

**Net tangible assets standard**—A trustee with a public offer license must have $A5 million (US$4.5 million) in net tangible assets or a guarantee (or a combination of both), unless the assets under its trusteeship are held by a custodian who meets these requirements.

The capital requirement has three objectives: a buffer against operational risks, evidence of a trustee’s commitment to its superannuation business, and an incentive for the trustee to manage that business well. The requirement may also provide funds to satisfy member actions against trustees for liability where professional indemnity insurance is inadequate.

**Auditors**—The revised regime gives a significant role of the external auditors of funds. Auditors must audit the annual statistical returns that funds provide to APRA. They must also conduct annual audits of risk management strategies and plans, stating whether the trustee has complied with these strategies and plans and whether it has adequate systems in place to ensure future compliance. They must refer any identified weaknesses or contraventions to the trustee regardless of materiality. The auditor’s annual report, augmented by these changes, must be completed and provided to APRA within four months following the end of the financial year.

Statutory whistle-blowing provisions require auditors to inform APRA at the same time as they notify trustees of any material contraventions of legislation that may have occurred, may be occurring, or may occur in the future, or if they believe the financial position of the fund may be, or may become, unsatisfactory. Another recent provision allows auditors and actuaries of DB funds to give information to APRA if they think it would help the regulator perform its statutory responsibilities. The provisions protect the auditors from any action, claim, or demand by, or liability to, any other party where such information is provided in good faith. In addition, persons providing information will have qualified privilege against self-incrimination.
APRA must approve auditors to carry out their responsibilities for superannuation funds. The auditor must be registered and associated with an approved professional association.

**Risk-Based Supervision Today**

This section describes APRA’s current strategic objectives, its organizational structure, and its supervisory methods.

While its objectives are well-established and its organizational structure is evolving, the agency’s tools and methods are very much in transition. The revised legislation and new operating standards described above became effective only in mid-2004 and the universal licensing of existing funds was only completed in June 2006.

**Strategic Framework**

The main law dealing with regulation of the superannuation sector, the Superannuation Industry (Supervision) Act of 1993 has as its objective “to make provision for the prudent management” of superannuation funds. APRA’s purpose under the law is to supervise the funds.

APRA’s own stated mission is “to establish and enforce prudential standards and practices designed to ensure that, under all reasonable circumstances, financial promises made by institutions we supervise are met within a stable, efficient, and competitive financial system” (emphasis added) (APRA 2008). It describes its supervisory approach as “forward-looking, primarily risk-based, consultative, consistent, and in line with international best practice” and as recognizing that the “management and boards of supervised institutions are primarily responsible for financial soundness.”

The financial promises made by trustees of DC superannuation funds are harder to define than the promises made by banks, insurers, or trustees of DB funds, which can be represented by amounts of money, even if only approximations (as with, for instance, insurance liabilities). For DC superannuation funds, the promise essentially draws on the general responsibility of trustees to manage the money of others—with the objective of funding their retirement incomes—as honestly and as prudently as they would manage their own. Additional responsibilities may be specified in the rules and trust deeds of individual funds.

APRA aims to plan its supervisory activities over a rolling three-year period, but its funding is determined annually. This funding is primarily
on a cost-recovery basis from levies on regulated industries, with the levy rates determined at the beginning of each year by the responsible minister of government. The minister strikes levy rates for each industry sector with the objective of raising funds sufficient to cover APRA’s planned activities in relation to that sector in the coming year. Industry groups may make representations to the government about these plans before levy rates are determined. The government has also on occasion given APRA special funding for particular projects.

APRA is ultimately accountable to Australia’s federal parliament but not to the provincial governments; and it must report annually to parliament on its activities. External scrutiny of the agency’s performance occurs through a variety of channels, including standing and ad hoc parliamentary committees and performance audits by the national audit office. The Financial Sector Advisory Council, comprising senior representatives of industry, reports annually to the government on the working of the regulatory system. Before making changes in its regulations or standards, APRA must lodge a regulatory impact statement with the government, explaining the rationale for change, summarizing the estimated costs and benefits, and describing its consultation with affected parties.

Organisation of APRA
APRA is a corporate body established by legislation in 1998. From 1998 to 2003, a nine-person board comprising representatives from industry and government agencies and a chief executive officer headed APRA. Since 2003, three full-time executives, one of whom is designated as chair, have governed the organization. The government appoints these people for terms of up to five years, and there is provision for another two appointees who may be part-time. A person may not be a member of this governing group if he or she is also a director, officer, or employee of a body regulated by APRA.

Below its governing group, APRA has five main divisions. Resources devoted to superannuation supervision are dispersed through the agency, rather than concentrated in one area (see annex 4.1).

Frontline supervisory staff in the specialized and diversified institutions divisions are assigned a number of institutions, usually from more than one (but not more than two) industry sectors. The number of entities will depend on their size and complexity, and the staff member’s experience. These people, called analysts, are the primary contact point between APRA and regulated entities and are the people primarily responsible for
their routine supervision, including both offsite analysis and onsite reviews. They are organized in branches or divisions headed by a senior manager who reports to the executive general manager of specialized or diversified institutions division.

In their supervisory and analytical work, the analysts call on the various supervisory support teams where the depth of specialist technical expertise is greater. People from these teams also participate in routine or special-purpose onsite reviews.

The enforcement teams, with support from legal services, take primary responsibility when a fund has been classified as “mandated improvement” in the Probability and Impact Rating System and the Supervisory Oversight and Response System (PAIRS/SOARS) or when a fund is in serious difficulty and is required to restructure. The separate enforcement unit concentrates specialist skills in the use of APRA’s statutory and regulatory powers, introduces staff without historical relationships with funds’ trustees and management that might cloud regulatory judgment, and sends a clear message to an entity that APRA regards its current situation as unacceptable.

The Policy, Research, and Statistics Division works on improvements in supervision policy—as expressed in law, regulations, and operating standards—and is the central collection point for quantitative research and for the collection and distribution of statistics on regulated entities.

In addition, a dedicated unit for fund licensing directed and coordinated the licensing of all existing funds prior to the June 2006 licensing deadline.

Cross-divisional groups of middle and senior management have been formed for superannuation and the other main industry sectors to establish an APRA-wide consensus on the application of policies and help ensure consistency of application. They also seek to identify emerging supervisory issues, acting as a sounding board for industry participants and representative groups and referring those groups as necessary to other parts of the agency, including its senior policy-making forums. In March 2006 APRA had 608 staff members, one-third of whom are engaged in the supervision of superannuation funds.

**Methods and Procedures**

APRA’s supervision of superannuation funds combines off-site analysis and on-site review in a continuous cycle of risk assessment, supervisory action (where necessary), and fund response.

Risk assessment draws upon the regular statistical information provided by funds; their risk management strategies and plans; audit and actuarial
reports, discussions with trustees, direct onsite observation, and member complaints. For large funds, public information such as media reports and investment ratings are also monitored. Where APRA has requested additional information or explanation, or has required that remedial action be effected by trustees, the quality and timeliness of trustee response is be taken into account in a fund’s risk assessment.

The PAIRS/SOARS model—Since late 2002 APRA has applied the same broad supervisory model to superannuation funds as it does to banks, other deposit takers, and insurance companies.

The basic framework for the first part of that model—risk assessment—is shown below:

\[
\text{inherent risk} - \text{management and control} = \text{net risk} \\
\text{net risk} - \text{capital support} = \text{overall risk.}
\]

Some variation in use is required for DC superannuation, where trustees have broad responsibilities to the members of a fund but do not make specific promises about performance. An assessment of capital support is, therefore, irrelevant (except for public offer trustee companies) and “overall risk” is the same as “net risk” (Allen 2004).

The measure of overall risk is then combined with the size of an entity to determine APRA’s supervisory approach. The weighting by size recognizes that, with limited resources, APRA must give more attention to larger entities than smaller ones; financial weakness in a large fund will affect the interests of more members and will pose greater risk to confidence in the superannuation system and its regulation as a whole. This regard for entity size is consistent with the risk-based approach to regulation.

For a DC superannuation fund, the combined model involves the following steps:

- assessing a fund’s gross inherent riskiness
- assessing its net riskiness, after allowing for the presence of various risk controls or mitigants
- assigning a descriptive probability or risk rating
- measuring the fund’s assets—a proxy for its importance or impact
- assigning a descriptive impact rating
- combining the probability and impact rating (PAIRS)
- mapping from the PAIRS rating to a supervisory attention index
- adopting a supervisory stance and consequential supervisory action plan.

This process is illustrated in figure 4.1.
An assessment of *capital support* or *financial strength* is retained in the rating of DB funds and the trustee companies of public-offer DC funds. In the case of DB funds, financial strength is measured by the extent to which the fund’s assets cover its short-term and actuarially estimated long-term pension obligations, by its earnings performance, and by its access to additional capital (for instance, from associated employers), if needed. The process is analogous to assessing capital adequacy in banks and insurers.

The method of assessing riskiness and impact, PAIRS, is essentially a structured framework within which supervisors make assessments and reach judgments about the risk areas that are important for each fund and whether they are well managed.

For all APRA-regulated entities, the PAIRS assessment of *gross inherent risk* considers the following:

- counterparty default risk: risk of losses from failure of a counterparty to meet its obligations
- balance sheet and market risk: risk of losses due to movements in interest rates and other market prices
- insurance risk: insurance underwriting risk or the risk that insurance cover will not be available as expected when needed
• operational risk: the risk of losses resulting from inadequate internal processes, people, and systems, whether these are internal to the regulated entity or in a service provider
• liquidity risk: the risk that an institution will not be able to meet its payment obligations as they fall due without excessive cost
• legal and regulatory risk: the risk of adverse consequences arising from failure to comply with all relevant laws and regulations
• strategic risk: risks to the continued viability of an entity as a result of change in the operating environment, including internally driven change such as merger or introduction of a new product line
• contagion and related party risk: risks to an entity’s business as a result of close association with another entity—the risks may be direct through financial exposure or indirect through reputation damage.

For superannuation funds, the most significant risks are likely to be balance sheet/market (from exposure to losses from movements in share prices, real estate prices, and interest rates), operational (record keeping or management of outsourcing contracts), and trustee fitness and propriety. These priorities are reflected in the five new operating standards for superannuation funds discussed earlier.

Strategic risk can also be important where funds are amalgamating or otherwise expanding rapidly, and regulatory risks can be significant given the complexity of the taxation, disclosure, retirement income, and prudential requirements. Insurance risk can be important for funds offering death and disability cover, while contagion risk can be significant for employer-sponsored funds, especially if they offer DB.

The controls or mitigants of these gross risks are classified in PAIRS as follows:

• quality of the governing board/trustees: their understanding of responsibilities; their experience, competence, and integrity; and the presence of conflicts of interest
• quality of senior management: experience, competence, and integrity
• effectiveness of operational management: includes human resource policies (recruitment and training) and, where relevant, management of outsourced operations by trustees
• information systems and financial controls: capacity to produce timely and reliable information for regulators and members
• adequacy of risk management systems: quality of arrangements for determining risk appetite, identifying and measuring risk, setting limits, monitoring compliance, and reporting
• compliance culture and procedures: compliance with laws and regulations; assessment of the competence, integrity, and independence of responsible staff members, as well as a fund’s information systems
• adequacy of independent review: internal and external audit and actuarial review, and assessment of competence and independence
• assessment of the systems of the external parties as well as the protections that the fund has under its contracts with these parties.

**Calculating PAIRS ratings**—To calculate a PAIRS rating for a superannuation fund, APRA analysts make two assessments of each of the 16 characteristics listed above.

The first is an assessment of the proportionate *significance* or relevance of the characteristic for that fund, considering the nature of its structure and operations. For instance, a retail fund that is part of a diversified financial group and that relies heavily on other members of the group for outsourced services would have a relatively high weight assigned to “contagion and related party risk,” regardless of any assessment of the strength of those entities or the measures in place to protect the fund’s interests. For both inherent risk and control factors, the significance weights add to 100. Each control element must have a weighting of at least 10 percent.

The second assessment relates to the *quality* of each characteristic. Quality is the extent to which each contributes to (for the inherent risk areas) or reduces (for the management and control areas) the overall riskiness of the fund.

Each element of inherent risk is assessed on a scale from zero to 4, ranging from very low risk to extreme risk. To guide their assessments and help ensure consistency in rating an individual fund, analysts refer to benchmark (rolling average) ratings for that fund’s peer group. The assessment of control factors also uses a scale from zero to 4, ranging from very strong to extremely weak.

The weighted numerical assessments of the various inherent risk and control elements are combined into an overall net riskiness score ranging from 0.25 to 4, with the summary inherent risk rating and the summary control rating accorded equal weighting.

These scores are converted to PAIRS ratings that rise exponentially, based on the fourth power, as the measure of financial strength measure falls. A net risk score of 2 will convert to a PAIRS rating of 16, while a score of 4 converts to the maximum of 256. This nonlinear feature mirrors the structure of commercial credit ratings and is aimed at ensuring that
the riskier entities are given particularly high profile with APRA staff and, consequently, the requisite more-intense supervisory attention.

**Impact**—After the PAIRS rating of a fund is calculated, an impact index is introduced.

While the impacts or consequences of serious financial problems or failures of financial entities depend on many factors, APRA uses total assets as a simple proxy. Its impact index is a linear function of assets with a floor of $A50 million (US$45 million) set on the basis that any failure, no matter how small, is likely to damage the public’s confidence in the financial system and its regulation. Medium-impact entities have assets of at least $A250 million (US$225 million), high-impact entities from $A2.5 billion (US$2.25 billion), and extreme-impact entities from $A25 billion (US$22.5 billion). About 50 superannuation funds are rated as “high” and the remainder as “low”; there are no extreme impact funds.

The supervisory attention index, shown in table 4.3, is the geometric average of the riskiness/probability index and the impact index. Supervisory attention increases with both riskiness and impact, but the composite index recognizes that there are economies of scale in the level of extra supervisory effort required in response to marginal increases in both riskiness and size.

A score on the attention index maps to a supervisory stance and action plan under SOARS. The mapping is illustrated in table 4.4, which shows SOARS’ four generic categories.

- **Normal**: In the normal supervisory mode APRA collects and analyzes the standard statistical and other information and conducts routine on-site reviews, with a minimum interval of two years.

<table>
<thead>
<tr>
<th>Probability rating/index (PAIRS)</th>
<th>Medium</th>
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</thead>
<tbody>
<tr>
<td><strong>Impact Index</strong></td>
<td><strong>Low 1</strong></td>
</tr>
<tr>
<td>Extreme 125+</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td>High 12.5+</td>
<td>4</td>
</tr>
<tr>
<td>Medium 1.25+</td>
<td>1</td>
</tr>
<tr>
<td>Low 0.25+</td>
<td>1</td>
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</tbody>
</table>

*Source: APRA 2004.*
Oversight: This category involves more intense monitoring with more frequent meetings with trustees, meetings with auditors, collection of additional information, and a readiness to step up supervisory or enforcement action quickly if there is any further deterioration.

Mandated Improvement: When a fund is rated in this category, APRA will direct trustees to develop and implement plans to correct the identified weaknesses. These may originate in management, asset composition, operational controls, or the trustee board itself. APRA may accept legally enforceable undertakings from trustees in regard to their remediation plans. It may also issue a show-cause notice requiring trustees to explain why the regulator should not take more severe action.

Restructure: At this point, the fund has encountered serious financial difficulty or is at risk of doing so, or members’ investments are considered to be in jeopardy from improper use by trustees. There may be significant breaches of the gearing prohibition or the inhouse investment restrictions.

APRA will consequently apply its stronger enforcement and remedial powers. For superannuation funds these include appointing an investigator, suspending and replacing individuals, and issuing directions to restrict fund operations. APRA’s primary objective is to ensure that members’ funds are safeguarded to the extent possible. Where appropriate, these funds will be transferred to another trustee. Following investigation, disciplinary actions against the trustees, auditors, and actuaries will be considered. Punitive actions include disqualification from further involvement in the superannuation industry, referral to

### Table 4.4. Supervisory Stance (SOARS)

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<thead>
<tr>
<th>Impact</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Extreme</th>
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</thead>
<tbody>
<tr>
<td>Extreme</td>
<td>Normal</td>
<td>Oversight</td>
<td>Mandated Improvement</td>
<td>Restructure</td>
</tr>
<tr>
<td>High</td>
<td>Normal</td>
<td>Oversight</td>
<td>Mandated Improvement</td>
<td>Restructure</td>
</tr>
<tr>
<td>Medium</td>
<td>Normal</td>
<td>Normal</td>
<td>Oversight</td>
<td>Restructure</td>
</tr>
<tr>
<td>Low</td>
<td>Normal</td>
<td>Normal</td>
<td>Oversight</td>
<td>Restructure</td>
</tr>
</tbody>
</table>

*Source: APRA.*
professional bodies in the case of auditors and actuaries, and prosecution
in the courts.

As well as rating all funds (other than those with fewer than five
members) under PAIRS, APRA rates approved trustees. These trustees
are exposed to operational and legal/regulatory risks, and their capacity
to manage these is important to the funds they administer. The more
diverse and complicated are their operations, the greater are these risks.
The risk assessment includes an assessment of capital support, given the
trustees’ potential liability for operational and compliance failings.

The front-line analysts/supervisors in specialized and diversified insti-
tutions divisions are primarily responsible for producing initial PAIRS
ratings. Depending on a fund’s complexity, the ready availability of all
relevant information, and an analyst’s experience, a rating may take
between a day and a week to complete.

Because consistency among funds and across the two divisions is
extremely important, and because there is a large subjective element in
assessments, a number of checks and balances are built into the system.
These arrangements are designed to strike a good balance between the
knowledge and judgment of front-line analysts/supervisors and the need
for consistency and rigor in supervision across all APRA-regulated entities.

Initial ratings are checked by a reviewer and the analyst’s line manager,
who subsequently owns the rating. Supervisory support division staff
members may question (but not change) ratings and may elevate signif-
ificant disagreements to APRA’s governing group. When confirmed, the
rating fixes the SOARS position on the basis of which supervisors then
construct the appropriate action plan. A PAIRS rating that sets a SOARS
position of “mandated improvement” or “restructure” may only be over-
ridden by the governing group. The PAIRS assessments for entities
ranked as “high” and “extreme impact” are also reviewed by a panel com-
prising the responsible line manager, relevant risk specialists, an industry
specialist, and representatives of the various crossdivisional committees,
and chaired by a PAIRS expert. Other checks and balances include a spe-
cialized PAIRS team that regularly analyzes the data and follows up on
outliers and summary reports; analysis by industry and peer groups over
time is provided to all analysts and management.

APRA does not publish its PAIRS/SOARS ratings of individual
funds and does not permit the funds to do so because of a concern
that public reaction to negative ratings could hinder remediation
actions and because of a desire to avoid the use of supervisory ratings
as a competitive device.
**Guidance for analysts**—The information to assess a fund is assembled predominantly from statistical and other statutory returns filed by all funds, from audit and actuarial reports, and from intelligence gathered by APRA staff during periodic onsite reviews of funds. Other sources include media reports, member complaints, and information supplied under memoranda of understanding with other regulatory agencies.

APRA staff members use this material to make risk assessments, the major input to PAIRS/SOARS ratings, with the assistance of guidance manuals. These manuals deal with various key aspects of an institution’s risk profile, such as the competence of the board, the strength of management, and the financial position. Superannuation funds presently have eight such manuals or modules covering the following topics relevant to a PAIRS rating:

- trustees of the fund
- managers and staff of the fund
- fund’s strategy
- fund’s structure and relationships with other entities
- capital (relevant for DB funds and trustees of public offer funds)
- fund’s risk management policies and capacity
- fund’s operational risk, including outsourcing
- balance sheet and investment risk.

Each module summarizes the various criteria relevant to supervisory assessment of an area and all significant statutory and regulatory provisions for which compliance must be checked. It lists documentation that the analyst should request from the fund, describes good practice, and provides examples of common problems or poor practice. It also provides a template for the supervisor’s written findings for the review and explains how these should feed into a new or revised PAIRS rating.

**Assessing a Fund’s Riskiness**

APRA staff members produce a risk rating for a fund by assessing its structure, operations, and balance sheet against a number of criteria. Each criterion is rated on a scale of 0 to 4, with six grades. For risk elements these range from “very low” (0 to 0.5) to “extreme” (3.1 to 4.0); for mitigants or control elements they range from “very strong” (0 to 0.5) to “extremely weak” (3.1 to 4.0).

The various ratings are based on qualitative rather than quantitative measures. A manual guides staff members in allocating ratings to funds,
advising them on which characteristics to look for and which rating should follow from an observed set of characteristics. It admonishes supervisors to avoid a checklist approach that attempts to force a fund to fit into every listed characteristic, encouraging them to apply judgment and commonsense.

The following sections summarize the guidance given on the two most prominent inherent risks for DC superannuation funds—balance sheet/investment risk and operational risks; the approach for risk management generally, and capital support for DB funds.

**Balance sheet/investment risk**—There are no quantitative restrictions on funds’ asset portfolios, other than the restrictions on inhouse assets (investments in an employer-sponsor and related entities), the sole-purpose test (investments must be for the purpose of delivering retirement income), and prohibitions on lending to members mentioned earlier.

APRA’s supervisory approach is as follows:

- determine whether a fund has a clear investment strategy
- assess whether that strategy is consistent with the trustee obligations
- make a judgment on whether the trustees, with service providers where relevant, are competent to carry out that strategy
- assess whether the trustees are capable of monitoring the strategy’s implementation and adapting it to changed circumstances for either the fund or for markets.

A well-run fund will have a clearly stated investment strategy (or strategies) consistent with the broad statutory requirements for prudence and appropriateness. The strategy will take into account objectives for risk and return and will specify policies on asset allocation, liquidity needs, valuation, administration, and custody. It will be reviewed periodically to ensure it remains suitable to the needs of fund members. Other things being equal, a fund with a higher risk portfolio will get more supervisory attention under PAIRS.

Strategies will vary from fund to fund depending on such factors as the age profile of members, the likelihood of large-scale departures (for instance, due to retrenchment), the expressed risk preferences of members, and the design of benefits.

Broad objectives should be clearly stated. They may be for an absolute rate of return, for a return with a certain margin above the rate of price inflation, or for a margin over a benchmark rate. Objectives should also include a level of risk tolerance and the time period over which performance will be measured.
Trustees should set allocation targets for the main asset classes consistent with the broad strategy or strategies adopted. These should be expressed as proportions, with a range to allow managers some flexibility in responding to market changes and to avoid frequent insignificant breaches of investment mandates. The higher a fund’s target rate of return and its tolerance of volatility, the greater will be the allocation to growth assets and acceptance of relatively low diversification. The lower the tolerance of volatility and occasional negative returns, the greater will be the allocation to income assets.

Asset portfolios must be reasonably diversified to satisfy statutory responsibilities for prudence, but there are no quantitative diversification targets set in regulation. APRA accepts that modest investment in high-risk assets can reduce overall portfolio risk. As noted, asset allocation strategies must be consistent with the fund’s objectives for growth and volatility and its members’ needs; as an extreme case, a heavy weighting of unlisted equities would not be consistent with an aging membership and the objective of steady income. Asset allocation must also cater for payment needs, with an appropriate proportion in cash or highly liquid fixed-interest investments.

When a fund portfolio has invested in particularly high-risk or complex investments, such as derivatives or hedge funds, APRA’s supervisors expect trustees to have performed additional due diligence on the risks involved and to have sought expert independent advice on the risks and appropriateness of those investments for the fund’s investment aims.

APRA provides specific guidance to its analysts on three asset classes: derivatives, direct lending, and foreign investments.

A fund investing in derivatives must have a specific risk management statement (a requirement since the mid 1990s) explaining how their use is consistent with the fund’s overall objectives and setting limits on usage. The supervisor will check on compliance with this statement, including the following:

- level of understanding of the risks demonstrated by the trustees
- use of derivatives consistent with the fund’s overall strategy
- limits on usage
- segregation of dealing and settlement
- procedures for monitoring and for re-evaluating risks
- extent of stress testing
- frequency of reporting to trustees, including any breaches of limits.

Where derivatives investment is indirect through another party, the trustees must have conducted an assessment of that party to see whether
its risk management controls would meet comparable standards. Derivatives must not be used to effectively gear the fund.

Funds may engage in lending directly or indirectly via investment in mortgage trusts where the underlying assets are loans to third parties. Direct lending should be governed by documented procedures for making the loans (including interest rates, loan-to-valuation ratios, valuation practices, and security) and for monitoring, provisioning, and writeoffs. Lending to members is not permitted.

Supervisors also scrutinize foreign investments closely to determine whether trustees have identified all of the risks and are capable of managing those. There must be clear policies for controlling exposures, including those for hedging strategies against exchange risk, for counterparty selection and limits, and for adjusting portfolios in response to changing country risk. APRA expects that a well-run fund’s asset allocation policy will be clearly documented and that trustees will closely monitor compliance with policy, whether investment is conducted inhouse or is outsourced.

Where investment is outsourced, APRA expects a well-managed fund to take considerable care in selecting, instructing, and monitoring managers. Selection should be by competitive tender. Investment mandates from trustees to managers should encompass objectives for rate of return and liquidity, allowable and nonallowable asset classes, the use of derivatives, allocation limits, portfolio duration, fees, performance benchmarks, and reporting. Trustees should review the performance of managers periodically against previously agreed objective measures consistent with the fund’s investment aims; trustees should be able to change managers without disruption to the fund.

There is no regulatory requirement for credit or investment committees; however, for large complex funds, or those with a component of high-risk investments, such a requirement would be regarded as good practice.

Documents consulted by APRA in assessing investment risk include balance sheet data, including statistics submitted quarterly (by large funds) and annually; cash flow statements and projections; investment mandates for external managers; investment manager reports; tender and evaluation documents relating to manager selection; and regular reports to the trustees.

A fund receiving a “very low” PAIRS rating on inherent balance sheet/investment risk will have well-diversified investments spread across different investment products and markets and no exposure to
volatility in returns. At the other end of the spectrum, a fund rated “extreme risk” on this criterion will have a concentration of investments in one product or market and high exposure to volatility. In between, a “high-medium” rating (1.6 to 2.0) is aligned with “some concentration” of investments in certain products or markets, and “significant exposure” to investment volatility.

The aspects of the guidance summarized above that deal with discipline in investment processes, such as limit-setting, monitoring, and reporting, will feed into the management and control rating.

The widespread availability to members of choice among a number of investment portfolios is complicating the meaning of trustee responsibility for managing investment risk beyond the need for clear strategies and properly managed execution. APRA has taken the view that trustees retain responsibility for the prudent structure of a fund in aggregate (particularly the need for diversification and liquidity) and that they need to ensure that this structure is not compromised by the subportfolio choices made available to or selected by members. It also requires that trustees provide appropriate advice and warnings to members about the risks to their own retirement savings from choosing only subportfolios that are highly concentrated or risky for other reasons.

**Outsourcing and other operational risks**—The PAIRS guidance manual describes a superannuation fund with very low operational risks as having one or more of these features:

- a simple legal and organization structure with clear reporting lines
- no reliance on related entities for core or complementary activities
- no outsourcing of material business activities
- simple products and low transaction volumes
- off-the-shelf information technology systems that suit the needs of the business, have no history of problems, and are adaptable for foreseeable changing needs
- minimal disaster threat from external events
- no reliance on a key person.

In contrast, a fund with extreme operational risks will have:

- complex structures and unclear reporting lines
- extensive reliance for core or complementary activities on related entities not wholly owned within the same corporate group
• outsourcing of material activities to unrelated third parties, with a history of unresolved problems
• complex business with many products and high volumes of complicated transactions
• information systems that are unable to meet business needs and/or many inherited/legacy systems
• vulnerability to external disaster
• heavy reliance on one person.

The supporting manual on operational risk covers a superannuation fund’s human resources policies, outsourcing, fraud prevention, administration, information technology systems, business continuity management, project management, and the introduction of new products and businesses. Given the widespread use of service providers in the industry, outsourcing is the most significant of these for many funds—and the subject of the new operating standard described earlier.

Trustees must undertake a full due diligence of any potential outsourcing partner, covering its technical capacity, risk management systems, and financial capacity. Trustees should look at track record and consult referees. Once they are appointed by formal contractual arrangement, the performance of outsourced providers must be monitored closely and their mandates reviewed and updated as necessary.

By regulation, outsourcing agreements must have the following elements:

• service monitoring arrangements, with clear description of services to be provided, quality standards to be met, and agreed-upon measurement methods and penalties for nonperformance
• fee schedules and payment arrangements
• procedures for monitoring, including access to the provider for the fund’s internal and external auditors
• access for both the fund and APRA to relevant documents and other information of the service provider
• access for both the fund and APRA to the service provider’s premises to investigate any matter relevant to the outsourcing arrangement
• a provision giving the fund and APRA the right to require that the provider have an independent audit of its activities
• assurances about the business continuity plans of the service provider (in the event of power failure or systems crash), including security of data, the maximum time for restoration of normal operations, emergency arrangements and plans for communications with members, and provision for the fund to retain access to critical information and
functions if the provider ceases to operate because of insolvency or other cause

• termination arrangements, including triggers and notice periods
• default arrangements, specifying default events and how and over what time these are to be rectified (and indemnity)
• transition arrangements, so that where outsourcing arrangements are terminated for whatever reason, agreements deal with access to records and software and otherwise protect the interests of fund members during the change
• dispute resolution procedures, including resort to arbitration where necessary
• liability and indemnity provisions that specify the extent of liability of each party and whether liability for negligence is limited, as well as the indemnity and insurance arrangements and the service provider’s measures to limit trustee exposure to an adverse event, including its insurance cover and internal audit
• confidentiality and security of information about the fund and its members.

Importantly, outsourcing agreements must ensure that the terms of any subcontracting agreements contain equivalent provisions to those that would otherwise apply to the service provider itself. Where outsourcing contracts are with members of the same financial group, the terms including fees must be on an arm’s-length basis.

Risk management—The guidance module on risk management deals first with the overall inherent risk profile of a fund and then with several key aspects of risk management: the role of the board of trustees, the development and implementation of a risk management framework, the risk management strategy and plan, the fund’s compliance function, management information systems and financial control, internal audit, external audit, and the role of the actuary in a DB fund. It overlaps substantially with various other parts of the regulatory framework, in particular the new regulatory standard on risk management summarized in the previous section.

In relation to inherent risk, the guidance emphasizes that the two main sources of risk for superannuation funds are balance sheet/investment risk and operational risks, including poorly managed outsourcing.

The guidance notes that, apart from the risks from outsourcing, operational risks can be greatest when processes are not properly documented and monitored, when management structures and intragroup relations
are complex, when computerized information systems have become dated, when trustee boards do not understand their responsibilities, when funds are merging, when funds have to cope with unusually large transaction volumes, when there is significant change in products offered to members, or when there is a lot of change in regulation.

Among the seven risk mitigants in PAIRS ratings, two particularly important ones are a fund’s general risk management framework and its operational management.

A fund rated “very strong” on risk management will have the following:

- a board that understands all major risks and exercises strong stewardship
- an effective, disciplined risk management framework that is regularly reviewed and endorsed by the board
- a dedicated risk management function with a direct line of communication to the board to ensure that the framework is up to date and being complied with
- clear senior management delegations
- proactive risk identification and control systems
- a strong risk culture throughout.

A fund with none or few of these features will be rated “extremely weak” in risk management. Although APRA has not mandated a centralized risk management function, it will give higher marks under PAIRS to a fund that has an area of management charged with identifying all inherent risks and their mitigants, that the mitigants are working effectively, and that this risk management framework is up to date, and that reports are made periodically to the board of trustees. In a large retail fund this function might not cover the entire risk management framework itself but would coordinate the necessary inputs from relevant areas, such as operations and investments. Ideally, this area would also have some authority to monitor and enforce compliance with the risk management policies endorsed by the board of trustees. One of APRA’s practice notes emphasizes that staff members responsible for monitoring and enforcing compliance with risk policies should have authority independent of the units they oversee.

In the area of operational management, a very strong rating would flow from the following:

- business line managers with significant experience and expertise, operating effectively as a team
- low turnover of experienced staff
• an effective management structure with clearly delegated responsibilities and reporting processes
• normal succession planning.

Capital support—Capital support is a critical element of PAIRS ratings of banks and insurance companies, but it is not relevant for most superannuation funds, which are DC in structure. An assessment of capital support is, however, made for trustees of public offer funds and for DB funds.

For trustees, the rating takes into account the current capital coverage relative to the regulatory minimum, earnings, and access to additional capital if needed.

Defined benefit funds are rated as having “very strong” capital coverage with a solvency ratio of at least 1.5 and “extremely weak” if that ratio is below 1. They are also rated on current earnings and on the availability of additional capital, if needed, from their employer-sponsors. The latter assessment takes into account the extent to which an employer is legally required to ensure the fund meets its obligations to members, the extent to which the sponsor has demonstrated that commitment in the past, and the financial capacity of the employer.

Small funds—To expedite the initial PAIRS rating of superannuation sector, APRA has adopted an abbreviated process for the large number of funds with assets less than $A50 million (US$45 million). These funds represent about 60 percent of all APRA-regulated financial institutions that require a rating, but they hold less than one percent of the assets.

In line with APRA's broader risk-based approach to prudential supervision, it is using a streamlined and largely automated rating for these entities. The building blocks of the PAIRS model are condensed and the prudential returns submitted by these small funds are subjected to automated analysis under a series of decision rules. A draft PAIRS rating is then provided to the responsible analyst, with information on the basis for the rating. Analysts can accept or amend the rating based on any additional knowledge of the institution that they might have.

Usefulness of PAIRS
PAIRS, a significant step forward for APRA as an integrated risk-based regulator, formalizes a common language and common approach across each industry and between industries—even though the detailed supervisory activities differ because of specific industry characteristics and practices. It imposes a stronger analytical discipline to a still largely
judgmental process and provides an audit trail to analyze or explain supervisory decisions and actions.

The PAIRS/SOARS framework has also strengthened the link from risk assessment to intensity of supervision and from there to the allocation of resources within APRA. It provides a statistical record of trends in the riskiness of the financial system and its component sectors over time, and it may indicate where statutory and regulatory requirements should be tightened or otherwise changed. In the future PAIRS ratings could be used in determining risk-based levies to fund APRA or risk-based premia for industry-funded protection schemes.

There are also potential pitfalls. The rating process is complex and could encourage a checklist approach to supervision. The requirement that analysts justify each assessment in writing is intended to mitigate this risk. There is also the risk that a fund has significant weaknesses that are not captured in the PAIRS taxonomy and might therefore be overlooked.

Finally, the rating process unavoidably remains largely judgmental. This means that validation will always be difficult, that achieving consistency will be a challenge, and that the quality of the ratings will rely heavily on the experience and skill of the people compiling them.

Statistics
In view of the large number of funds, APRA's supervision—including constructing the PAIRS ratings—relies heavily on statistical and other information supplied by funds.

Funds with assets of $A50 million or more must provide information quarterly, while all APRA-regulated funds must submit an audited annual return within four months of the end of the year. These returns are submitted electronically by a system that lets funds enter data and validate the information entered, and then digitally sign and submit the information in an encrypted form.

Annual attestation—Trustees of superannuation entities are required to submit annually a signed attestation that information provided to APRA accurately shows the fund’s financial position and transactions and that the trustee has adequate reporting systems and internal controls supporting preparation of its financial information.

Human Resources Policies
APRA aims to have a mix of staff members with industry experience (who may stay with the agency for a few years) and staff members who intend to make a career in prudential regulation. It recruits junior supervisory
staff on graduation from university, primarily with degrees in finance, commerce, accounting, economics, and actuarial studies. It recruits people into middle and senior management roles from the finance sector, regulated industries, and sectors such as accountants and actuaries.

APRA’s remuneration rates are related to movements in finance sector market rates, but the agency’s budget constrains it to a benchmark well below the median market rates. As a result, APRA has some difficulty in attracting and retaining as many high-quality supervisory staff as it would like to employ. Many of the best professionals with two or three years’ experience are attractive to commercial employers in the finance sector, particularly regulated entities.

Training for APRA’s staff includes in-house, general and specialist, training in prudential regulation and attendance at external seminars and conferences. Staff shortages and concerns about confidentiality of information have limited the use of short-term secondments to industry as a training device. APRA has also had a policy to rotate staff among its frontline and supervision divisions as a training tool, but staff shortages and work pressures have hampered its implementation.

**Evaluation of Effectiveness**

Before the introduction of PAIRS and SOARS, APRA applied only very crude means of determining its supervisory priorities for superannuation funds based largely on size and very clear evidence of problems. The risk-based framework has allowed much better targeting of resources to higher risk to assessing and remediating higher-risk funds. It is too early to do a comprehensive assessment of the impact the risk-based framework has had on the effectiveness of supervision. As experience with the PAIRS risk model had accumulated, APRA has been assessing its diagnostic value by tracking the migration of institutions among the different supervisory stances. Since the model was introduced, for example, a much higher proportion of institutions in the “mandated improvement” stance were upgraded rather than downgraded to “restructure”; a significant number also exited the industry in an orderly fashion. This provides some confirmation that the PAIRS/SOARS framework has helped to improve the timeliness and effectiveness of APRA’s intervention.

In the future APRA will also be able to use outputs from the PAIRS/SOARS model to produce indicators of the prudential standing of the industry at points in time and trends in that over time. These are, of course, only very approximate indicators of the contribution made by prudential regulation. Some more useful measures of supervisory effectiveness will also be available—for instance, the speed with which funds
that fall into the “restructure” category are returned to “oversight” or “normal” as a result of APRA’s actions.

Annex 4.1

Figure A.4.1. APRA: Organizational Structure 2005

APRA’s governing body
Three full-time executive members

Specialized institutions
Supervising stand-alone financial entities, including the majority of superannuation funds by number; on-site review and off-site analysis; PAIRS/SOARS ratings

Diversified institutions
Supervising financial conglomerate groups, including many large retail funds; on-site review and off-site analysis; PAIRS/SOARS ratings

Supervisory support
- industry technical specialists
- actuarial services
- specialist risk services
- legal services
- enforcement

Policy, research, and statistics
- policy development
- quantitative analysis
- statistics
- international relations

Corporate
- human resources
- information technology
- finance
- internal audit
- business improvement
- public affairs
- secretariat

Notes

1. Whereas most countries use the term “pensions” to refer to all payments made to retired workers, Australia uses pension only for government payments and uses the term superannuation to refer to private (both mandatory and voluntary) pension arrangements. The word superannuation derives from superannuant, which describes someone who retires from service because of age.

References


CHAPTER 5

Risk-Based Regulation and Supervision of Pension Funds in Mexico

Solange J. Berstein and Rómulo Chumacero

Introduction

The risk-based supervision (RBS) approach being developed in Mexico is a response to the maturing of the relatively new pension system and the growing complexity of the financial markets in which it operates. Market conditions increasingly require the supervisor to adjust promptly to a dynamic environment and to be able to focus more attention on those entities demonstrating a higher level of risk. The capacity to consistently rank the pension funds according to organization, activities, ability to cope with risks, and capacity to provide an early warning of emerging problems is now perceived to be crucial for effective financial supervision. The development of several types of RBS methods has proven to be a useful means to achieve these purposes.

Mexico provides an interesting example of RBS of a defined contribution (DC) pension system because of its use of the Value at Risk (VaR) approach. Mexico’s RBS methodology involves detailed regulation of the risk parameters and risk management architecture of pension funds. The model—which includes monitoring operational, credit, and market risks—is at an early stage of development. The VaR approach in combination with
quantitative restrictions measures and controls market risk. Although it remains too early to undertake a complete assessment this framework provides a valuable opportunity to consider whether this approach generates more efficient outcomes than a one that relies only on quantitative investment restrictions.

The chapter is structured as follows: The first section provides a brief description of the pension reform that introduced the individual capitalization system. The second section provides a detailed description of how the regulatory regime has evolved to incorporate the RBS framework. The third section explains how supervision is conducted today; the fourth provides a brief evaluation of the RBS approach in Mexico. The concluding section offers recommendations and lessons that may be helpful for other countries.

**Pension System Reform**

The main social security systems in Mexico are the Instituto Mexicano del Seguro Social (IMSS) and the Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE). The IMSS, which covers private-sector employees, has operated as a funded individual account system since the 1997 reform that replaced the pay-as-you-go (PAYG) system for private-sector employees. The ISSSTE is a PAYG system for civil servants. Additionally, multiple other systems cover civil servants, state companies, local government employees, and development banks, all of which provide health insurance, disability and survival pensions, work-related accident and occupational disease insurance, and old-age benefits. These institutions provide services either directly or through the IMSS or the ISSSTE.

The 1997 reform established the Administradoras de Fondos para el Retiro (Afores), a new type of institution responsible for managing individual accounts and investing savings in the new pension funds known as the Sociedades de Inversión Especializadas de Fondos para el Retiro (Siefores). The assets of the Siefores and Afores are segregated to reduce potential conflicts of interest, to ensure the security of the operation of the system, and to provide better control over the investments of pension funds. The Afores are joint stock companies that are required to act in the best interest of the workers who invest with them. The model is similar to that in Chile, where there is an explicit separation between the fund and the manager, and participants are permitted to switch between managers. The government’s primary role in this system is to supervise and provide certain guarantees.
After nine years, funds under management in the reformed system have increased significantly, from less than 1 percent of the gross domestic product (GDP) in 1998 to more than 7.4 percent in 2006. The number of account holders has increased as well, from 11 million in December 1997 to more than 36 million in 2006.

Every two months employers must deposit contributions to the workers’ individual accounts. This is done through the banking system, along with other social security contributions paid by employers, in conjunction with Empresa Operadora de la Base de Datos Nacional SAR (Procesar), the centralized agency that manages the pension system’s databases. Procesar, which is owned by the Afores and several banks, collects pension contributions jointly with IMSS and ensures the registration of accounts. Regardless of its size, each Afore is required to buy one share of Procesar. Fees charged by Procesar must be cost based, and the amount per transaction charged to each Afore may not differ. In keeping with its nonprofit status, Procesar does not distribute dividends.

The Afores are responsible for managing the funds on behalf of affiliates by investing them in a Siefore. Afores compete with each other for business and are limited to a 20 percent market share in terms of the number of accounts that they manage. In August 2006 there were 18 Afores. As the largest had only 15.4 percent of the market, this provides an environment for active competition. Competition among Afores has been increasing in recent years, as evidenced by the entrance of six new companies and the lower commissions being charged to affiliates. Each Afore must establish at least two Siefores that fulfill the portfolio specifications for the two categories of funds. The individual members select from among the two options, and the designated Siefore receives and invests the contributions forwarded to it.

The government plays several important roles in this system. First, it undertakes regulation and supervision through the Comisión Nacional del Sistema de Ahorro para el Retiro (CONSAR). CONSAR supervises the overall pension system, including the operations of Procesar. This is particularly important, given the compulsory nature and the inherent principal-agent challenges of individual account pension systems in which members typically have a very limited capacity to access or understand essential information about costs, risks, and other key operating characteristics. This principal-agent problem, chronic in nearly all financial contracts, is magnified in the case of pensions because of many workers’ myopia and the presence of government guarantees. Regulation and supervision can be important mechanisms to mitigate these multiple agency problems.
The government also contributes directly to workers’ accounts. This involves a fixed amount (cuota social), as well as a variable amount based on the workers’ salaries. The average amount contributed by the government is approximately US$7.8 a month for minimum wage earners. This constitutes about 90 percent of the total contribution to individual accounts (employee, employer, and government) for workers receiving the minimum wage.

Finally, the government provides a minimum pension guarantee ensuring that retirees affiliated with the IMSS before 1997 receive the pension to which they were entitled according to the rules of the previous system.\(^3\) The existence of these guarantees implies that for a large portion of current affiliates the financial performance of the system has almost no impact on their pensions.\(^4\) Consequently, market discipline, even with knowledgeable and active participants, would not be effective by itself in controlling risks and establishing investment portfolios appropriate for a pension fund. This presents a challenge to the regulator and limits one of the tools that can be used for RBS.

Afores have become important participants in the Mexican capital market, especially in the public debt segment because portfolios have been concentrated on these types of instruments. The participation of pension funds in the Mexican capital market has contributed to the building of the yield curve for public debt that is the benchmark against which to judge corporate debt market development.

Although the system’s coverage has increased significantly, the problem of incomplete participation in the pension system, as in most countries in Latin America, remains at the top of the agenda in Mexico. In terms of the proportion of the economically active population making contributions, Mexico lags behind countries like Brazil, Chile, Costa Rica, and Uruguay. Moreover, when coverage is measured as a proportion of the old-age population receiving benefits, Mexico is also behind Argentina, Peru, and República Bolivariana de Venezuela (Rofman 2005).

Some specific actions have been undertaken to increase coverage. Although these measures should contribute to some increase, evidence in countries like Chile shows that after 25 years of reform the expected result is small because people do not have a full sense of value of their accounts.\(^5\) In fact, a survey in 2002 showed that almost all affiliates do not have any information on their accounts. In the case of Mexico one of the main reasons could be that the guarantees provided to people who were members of the old system also mean that people display little interest in their retirement savings accounts.
Adaptation of the Regulatory Regime to Risk-Based Supervision

Implementing an RBS approach requires changes in regulation that implicitly or explicitly promote sound risk management. In the case of Mexico, several changes have been undertaken in terms of financial and operational risk management. These changes have been implemented mainly through regulatory pronouncements, known as Circulars, issued by CONSAR and available at http://www.consar.gob.mx.

Licensing

The CONSAR board must approve and license a new Afore before it is permitted to enter the market. The law requires that 51 percent of the capital of an Afore be Mexican. However, this limitation does not apply in the case of financial institutions from countries with which Mexico has international agreements. These foreign institutions are permitted to have an Afore as a subsidiary.

The minimum capital requirement is approximately US$2.5 million. Additionally, each Afore has to manage two funds: These are known as Basic Siefore 1 and Basic Siefore 2 and are the two investment alternatives provided by each company to their affiliates. The difference between the two is that the first is limited to a more conservative portfolio than the second. There are fixed minimum capital requirements of US$40,000 for Basic Siefore 1 and US$10,000 for Basic Siefore 2. Furthermore, the Afore must have a reserve invested in each Siefore, which amounts to the equivalent of 1 percent of the funds under management. This reserve would be used to compensate the fund in the event of a loss of value related to a violation of the regulations.

When seeking authorization, an Afore must inform CONSAR of the names and qualification of the proposed members of its board, the general manager, and other senior management. The board must have at least five members. The CONSAR must approve the independent members of the Afore board. The CONSAR must also approve the regulatory compliance officer whose task is to keep the board and shareholders informed about all compliance matters.

The authorization process involves four steps.

• Approval of the Afore and the Siefore: An application must be submitted to CONSAR. Once the approval is given, the manager has 120 days to present all the necessary documentation, including the investment and policy manuals.
• **Verification and certification:** CONSAR verifies the information provided by the Afore and Siefores and certifies that personnel have adequate training to follow the operational and accounting procedures and sales agents have the necessary training. The verification of risk management procedures is especially important under the new regulations.

• **Approval of the Afore by CONSAR and the Ministry of Finance.**

• **Initiation of operations by the Afore and Siefore.**

It could be suggested that implementation of the RBS approach increases barriers to entry because potential entrants face substantial obstacles posed by the new extensive risk management requirements in addition to the existing compliance-based regulation. However, the new requirements do not seem to have impeded the rapid rise in the number of market participants and the removal of other barriers, such as the ability of affiliates to switch Afores, is designed to promote competition. In addition, it is expected that the compliance-based regulation will be relaxed gradually as CONSAR becomes more comfortable with the quality of risk management and the operation of the RBS approach.

CONSAR has the authority to revoke the license and close the operation of an Afore that persistently violates the regulations or does not release the necessary information to the supervisor. An Afore may also be terminated if it fails to recognize the authority of the supervisor or if it enters into bankruptcy proceedings. Before any liquidation process starts, the accounts of affiliates are transferred by affiliates to another Afore or are transferred by the supervisor to the central account; they then are distributed to other Afores if the affiliate does not choose a specific Afore. When a merger occurs, the new company maintains the combined accounts but is required to charge only the lower level of the fees charged by the two merging Afores.

**Conflicts of Interest and Corporate Governance**

The need to control conflicts of interest is especially important in light of the fact that approximately one-half of the Afores belong to financial groups. CONSAR verifies that Afores are not undertaking operations that benefit their shareholders at the expense of their affiliates. Afores that have both financial and other ownership associations (such as telephone or television companies) are closely examined to ensure that they are not engaging in prohibited practices. These practices include:

• purchase or manipulation of instruments by the Siefore from the financial group to improve the latter’s financial position
• borrowing of bonds under the Siefore’s custody by the financial group without formal authorization or benefit to the Siefore
• extension or receipt of credit lines with related parties: Although these may have a commercial purpose, they are strictly prohibited by CONSAR’s regulations because they can give rise to substantial conflicts of interest (except in the case of intraday credit lines the Afores receive for settlement from international counterparties).
• services contracts with the financial group: These contracts can be at higher prices than they would have been if they were made with an independent party or if the tasks were undertaken internally. There is also the possibility that the financial group can gain knowledge about the portfolios, strategies, risks, and Siefores’ positions, quotations, and operations it could abuse if it undertakes risk management and investment functions.

Although regulations control these conflicts of interest, the capacity for effective supervision is uneven. CONSAR is working on a model to detect situations where funds are not operating in the interest of the workers (CONSAR 2006).

In addition to conflict-of-interest controls, CONSAR regulates the corporate governance and risk management of Afores and Siefores. Each Afore is required to have a board of directors of at least five members appointed by the shareholders. At least two of members must be independent, and this proportion of independent members must be maintained if more than five members are on the board. The independent members must be financial, economic, and judicial experts, and must also sit on the board of directors of the Siefore. The board has specific legal responsibilities and an important role in managing and controlling operational and investment risks. It is responsible for the constitution of the Operational Risk Committee (Comité de Riesgo Operativo) and the Financial Risk Committee (Comité de Riesgo Financiero) for the Siefore; these committees are responsible for the Operational and Financial Risk Management Policies and Procedures Manuals. The board must approve those policies, which must be sent to CONSAR for its endorsement. The board also sets the level of operational and financial risk tolerance for the Afore within the limits allowed by regulation.

To prevent prohibited practices, CONSAR has access to extensive daily transaction information from Banco de Mexico (Banxico) regarding securities, futures and forwards, options, positions by intermediary, counterparties, and hours of operation. It also receives information from funds, including daily positions, transactions, and registrations.
As operational records might be required from other local and foreign authorities, CONSAR has Memorandums of Understanding (MOUs) with Banco de Mexico, Comisión Nacional de Banca y Valores (CNBV), Secretaría de Hacienda y Crédito Público (SHCP), and international authorities such as the Securities and Exchange Commission (SEC) to facilitate the exchange of information.

The model involving the analysis of the transactional information being implemented by CONSAR is designed to trigger alarms resulting in direct questionnaires to participants, other requirements for information, or inspection visits, leading to requests to the funds to revise their methods of operations. Greater scrutiny may inhibit some practices, even if it is not possible to find enough evidence to sanction a prohibited operation.

Each Afore is required to have an independent risk unit (Unidad para la Administración Integral de Riesgos (UAIR)). This unit is headed by a Chief Risk Officer who reports to the board. The risk management unit may be operated inside the Afore or it may be outsourced. This unit provides support to the Operational Risk and Financial Risk Committees; it identifies, measures, monitors, and informs the Afore’s board of directors of the risks faced by the Afore and Siefores.

The risk unit has several functions:

- ensuring that risk management is comprehensive, covering all areas of the institution
- suggesting methodologies to measure and monitor risks
- implementing the methodologies following approval by the Operational Risk and the Financial Risk Committees
- determining the reasons for deviations of risk limits and assessing whether these deviations are persistent
- informing the risk and investment committees, the board, and the regulatory compliance officer of deviations promptly.

Afores are required by regulation to have an independent compliance officer. This individual must have at least five years of relevant experience and may not simultaneously be an external auditor for the Afore. The Afore must provide all the necessary information requested by the compliance officer. However, since this officer has no specific assigned tasks, the responsibilities of the position vary significantly among companies. CONSAR is seeking to better define the role of the compliance officer.

The Operational Risk and the Financial Risk Committees must include one independent member of the board, one nonindependent member of
the board, and the person responsible for the independent risk unit. The General Manager of the Afore directs both committees. The persons in charge of the operational processes in the company in the case of the Operational Risk Committee and the persons involved with financial management in the case of the Financial Risk Committee and the independent compliance officers for both committees must attend every session. They do not, however, have a voting status.

Both of the risk committees are responsible for determining risk tolerance levels and risk limits, approving and reviewing models and measurement methods, ensuring policy and procedures manuals are up-to-date, checking compliance with risk policies, and reviewing limit breaches and the corrective action taken.

In summary, these committees are the board’s instruments to manage and control risks. They approve the risk measures and controls proposed by the independent risk management unit and report to the board. Under the new prudential rules for risk management published in February 2006, the independent risk management unit has a key role in defining methods and procedures for measuring and controlling financial and operational risks. The proposals of this unit are made to the relevant committees for approval, which then report on them to the board. Finally, the independent risk unit informs CONSAR on a quarterly basis about the economic, financial, and other consequences that the Afore would face if the operational risks materialize.

A further level of control relating specifically to investments is provided by the Investment Committee, comprising executives, which undertakes the following tasks:

- ensuring that investment strategies are consistent with the investment regime
- determining the composition of the portfolio
- approving the custodian
- approving the reconfiguration of the portfolio in the event an investment limit is breached
- defining the portfolio benchmark for each fund.

Valuation, Information Disclosure, Accounting, and Auditing Rules and Practices

Two private companies supervised by the CNBV are responsible for pricing instruments and designing valuation methodologies. In the case of illiquid instruments, theoretical models for valuation are used if there
is no market price. Market participants argue that they do have rules to update prices periodically; in some cases, however, instruments are still priced by the value of the last transaction, even if this was a long time ago. Because illiquid instruments are common in Mexico, this is a key issue. There are also valuation providers that take the price vector from a price vendor, value the portfolio of the Afore, and compute the VaR or other requirements.

Information disclosure may play an important role in a RBS framework because it may encourage market discipline. Therefore, significant efforts are being made to provide information on investment policies, VaR calculations, fees, and rates of return. However, given the particular characteristics of the Mexican market, where contributors are not financially knowledgeable and there is a general lack of interest, the impact of information on market discipline is limited. Moreover, the presence of guarantees limits the impact of investment performance on the pensions received by a significant sector of the population, reducing the incentives to monitor performance and the potential role of market discipline.

The external auditors who inspect the financial statements of the Afores, Siefores, and Procesar must be certified and up-to-date in their professional qualifications as public or licensed accountants. They must have a minimum of three years of experience participating in the preparation of fiscal reports or external auditing work for financial sector entities and must be designated by a professional association contracted by the Afore, Siefore, or Procesar. The external auditor, as well as the professional association who oversees the auditing profession, must be independent of the management of the Afore. The management council of the audited entity must approve the contract for auditing services. CONSAR must be informed about the contract and receive all the documentation derived from the auditing services. External auditors may be changed by the Afore, but CONSAR is required to be informed in advance about the substitution and why it is occurring.

In the event that CONSAR detects any irregularities in the work of the external auditor or in the functioning of the professional associations, it must pass this information to both the senior management and board of the Afore. The later must decide whether to appoint a replacement auditor. If the board members decide against replacing the auditor, they must explain to CONSAR why they have made this decision.

The tasks of the external auditor include assessing the quality of risk management and internal controls on an annual basis. Auditing work must follow the Auditing Rules and Procedures issued by the
Instituto Mexicano de Contadores Públicos (Mexican Institute of Public Accountants (IMCP)), by one of the several federations recently split from the IMCP that certify the external auditors, or by internationally accepted standard setters. If the external auditor detects any irregularity or other situation that threatens the financial stability, liquidity, or solvency of the fund, that auditor must immediately present a detailed written report about the observed situation to the president of the board of directors, the compliance officer, the internal auditor, and CONSAR. CONSAR may ask the audited entities, federation, and the external auditor for specific information.

The audited entities must present to CONSAR by the last working day of April of each year the external auditor’s report, including the basic financial statements, explanatory notes, and opinions issued by the external auditor. CONSAR may ask the external auditor for any background information or explanations of the report.

**Investment Regulation**

Investment regulations in Mexico seek to prevent Siefores from taking excessive risk, encourage them to avoid possible conflicts of interest, and require diversification of the portfolio. The regulations are designed to ensure that there is an adequate infrastructure for investment and risk management in the Afores and that investment teams are appropriately qualified.

In Latin America the regulation of the investments of pension funds has primarily relied on quantitative restrictions. This is done through such means as specific limits by type of instrument, risk rating, group of instruments, specific issuers, and asset classes. In Mexico, quantitative restrictions are less extensive than in other countries and the law confers a significant discretion to CONSAR board to define the types of investment permitted for pension funds. Permitted categories currently include variable income instruments with no restrictions, foreign issued paper up to 20 percent of the fund, and derivatives with no major restrictions in terms of the type of contracts.\(^7^,\(^8\)

Several modifications to the investment regime, most recently in September 2006, outlined below have been announced through a Circular rather than by amending the law. Even though approval must be sought from CONSAR’s Advisory Committee (the Comité Consultivo y de Vigilancia) and a Government Board (Junta de Gobierno) in which workers, employers, and the government participate, it is significantly easier than changing the legislative law.
Main Changes in Investment Regulation

When the reformed pension system started in 1997 the investment regime was very rigid in terms of the types of instruments allowed for pension fund investments. Since 2001 major changes have been made to this regulatory framework. The evolution of the investment requirements is shown in table 5.1.

Table 5.1 shows that until May 2004 pension funds in Mexico could only be invested in highly rated fixed-income instruments. Mainly because of the short supply of corporate instruments between 1998 and 2004 on average more than 85 percent was invested in government issued paper.

In 2002 Siefores were allowed to take long or short positions in derivatives such as swaps, futures, and options as long as the underlying asset was allowed by the investment regime. At the same time the duration restriction was replaced by a VaR measure to control risks. The use of duration limits was no longer considered appropriate in an environment in which derivatives were allowed because the potential leverage of derivatives is better limited by a VaR measure. Derivative operations could be done in formal secondary markets or over the counter (OTC). Listed markets are defined in Banco de México regulations. Additionally, Afores have to be certified in advance to be permitted to engage in these transactions so that CONSAR is able to verify that they were able to undertake the operations in a secure environment. The requirements for investments in derivatives, established by the Central Bank, include the following:

- a global strategy for the operation with derivatives that is approved by the risk and investment committees
- the establishment of limits for derivative transactions
- adequate contracts with counterparts
- measurements of the contribution to total risk of the operation before taking positions
- operations registered and managed by different parties
- daily valuation and monitoring of investments.

The main change in the investment regulation made in August 2004 require that each Afore offer at least two funds. Basic Siefore 1 continued with the prior investment regime but with the ability to invest up to 20 percent of fund assets abroad. Basic Siefore 2, established at that time, is permitted to invest up to 15 percent in variable-income instruments and up to 20 percent abroad. Variable-income investments are required
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Market risk</td>
<td>Min 65% on assets with duration below 183 days</td>
<td>Max weighted-average duration of 900 days</td>
<td>VaR limit of 0.6% of total assets</td>
<td>VaR limit of 0.6% of total assets daily</td>
<td>Basic Siefore 2 VaR limit of 1% of total assets daily. Basic Siefore 1 limits stayed in 0.6%</td>
</tr>
<tr>
<td>Credit risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAA, AA, A instruments</td>
<td>Max 35% in non-governmental instruments (AA-minimum grade)</td>
<td>Max 100%, 35% and 5% Respectively</td>
<td>Max 100%, 35% and 5% respectively</td>
<td>Max 100%, 35% and 5% respectively</td>
<td>Max 100%, 35% and 5% respectively</td>
</tr>
<tr>
<td>AAA, AA, A issuer</td>
<td>10%, 10% and 0% respectively</td>
<td>Max 5%, 3% and 1% respectively</td>
<td>Max 5%, 3% and 1% respectively</td>
<td>Max 5%, 3% and 1% respectively</td>
<td>Max 5%, 3% and 1% respectively</td>
</tr>
<tr>
<td>Related issuers</td>
<td>Max 15%</td>
<td>Max 15%</td>
<td>Max 15%</td>
<td>Max 15%</td>
<td>Max 15%</td>
</tr>
<tr>
<td>Government papers</td>
<td>Min 65%</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
</tr>
<tr>
<td>Private issuers</td>
<td>Max 35%</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
</tr>
<tr>
<td>Financial institutions</td>
<td>Max 20% of amount issued</td>
<td>Max 20% of amount issued</td>
<td>Max 20% of amount issued</td>
<td>Max 20% of amount issued</td>
<td>Max 20% of amount issued</td>
</tr>
<tr>
<td>Inflation protection</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Min 51% inflation protected instruments

Eliminated for Basic Siefore 2

Basic Siefore 1
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Derivatives</td>
<td>Not allowed</td>
<td>Not allowed</td>
<td>Allowed if underlying asset allowed (forwards, futures, swaps, and options)</td>
<td>Allowed if underlying asset allowed (forwards, futures, swaps, and options)</td>
<td>Allowed if underlying asset allowed (forwards, futures, swaps, and options)</td>
</tr>
<tr>
<td>Counterparty credit risk, AAA-5%, AA-3% and A-1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign investments (debt above A-and equity)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Foreign currency denominated instruments BBB+, BBB</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5% and 3% respectively</td>
<td>5% and 3% respectively</td>
</tr>
<tr>
<td>Capital protected variable income</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>15% (only Basic Sifore 2)</td>
<td>Is not obligatory to set a capital protected note to invest on equity. Additional Sifores allowed to invest up to 30% on equity</td>
</tr>
<tr>
<td>Dollars, euros or yens</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>30%</td>
<td>30%</td>
</tr>
</tbody>
</table>

* Source: CONSAR 2006.
* August 2003 this limit was removed.
** Two Sifores allowed with different investment limits.
to be conducted through diversified instruments linked to indexes and with capital protection. All affiliates under the age of 56 were permitted to choose between the two Siefores; if they did not choose, they were assigned to Basic Siefore 2. Older workers, those over the age of 56, are required to invest in Basic Siefore 1.9

The capital protection rules initially required the Siefores to match their investment in variable-income instruments with holdings in zero coupon bonds in a proportion such that the value to maturity of the fixed income would be equivalent to 100 percent of the capital in the variable instruments. This was intended to create conditions in which any capital losses in the equity component of the portfolio would be compensated by the fixed-income part, ensuring that when the bonds were held to maturity there would be no nominal decrease in the value of the investments. The variable-income part of the investment involved in this capital protected part of the portfolio is counted in the overall variable-income limit of 15 percent; the fixed-income part is considered as part of the fixed-income investment.

The investment in capital-protected variable-income instruments may also be done through structured notes, by investing in a fixed-income instrument and an index or derivatives at the same time, or even buying the specific instruments that replicate the index. In this last case funds have four days to buy all the necessary individual instruments and are allowed to have a permanent 1 percent deviation with respect to the index.

In July 2006, CONSAR made regulatory modifications to further facilitate equity investments. After that time, Afores were no longer obliged to use capital protected notes as an equity vehicle; they were allowed to invest directly in equity through the replication of authorized equity indexes (either by buying each individual stock, using derivatives or through Exchange Traded Funds (ETFs)). This new approach has become the most common option for the AFORES.

Before Siefores invest in variable-income instruments, derivatives, and foreign instruments, they must demonstrate to the regulatory agency that they are capable of managing these investments adequately and certified by the authority to undertake these operations. Although investment in derivatives has been allowed since 2001, Siefores have been slow in utilizing this opportunity.

Coincident with allowing Siefores to invest in derivatives, CONSAR introduced the VaR approach to control the overall risks in the investment portfolio. The VaR is set at 0.6 percent and 1 percent of the total funds, for Basic Siefores 1 and Basic Siefores 2, respectively. This parameter
was originally set to approximately replicate the risk limits that were imposed through the duration limitation on the portfolio that they effectively replaced. The recent option of investing in variable-income and foreign instruments has made it more attractive for Siefores to invest in derivatives. More have sought approval from CONSAR to undertake such transactions. Table 5.2 shows that many Afores still are not certified to conduct all types of derivative transactions that are allowed.

The progressive broadening of investment options over the years means that affiliates now have to understand more complex alternatives when they choose an Afore. They also have to decide between the two Siefores that each manager is required to offer, each of which has a different investment regime. Both CONSAR and the Afores have made important efforts to provide the necessary information to affiliates to enable them to make these choices. When the new investment regulation was launched, workers received a brochure by mail explaining the new investment regimes and had 60 days to select the Siefore in which they chose to invest.

Table 5.2. Certification for Derivative Transactions

<table>
<thead>
<tr>
<th>Afore</th>
<th>Capital protected notes</th>
<th>Foreign instruments</th>
<th>Futures</th>
<th>Forwards</th>
<th>Swaps</th>
<th>Options</th>
<th>Foreign counterparts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actinver</td>
<td>YES</td>
<td>YES</td>
<td>IP</td>
<td>IP</td>
<td>IP</td>
<td>IP</td>
<td>NO</td>
</tr>
<tr>
<td>Ahorra Ahora</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Afrime-Bajío</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Azteca</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Banamex</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Bancomer</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Banorte</td>
<td>YES</td>
<td>YES</td>
<td>IP</td>
<td>IP</td>
<td>NO</td>
<td>IP</td>
<td>NO</td>
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<tr>
<td>Coppel</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
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<td>HSBC</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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<tr>
<td>Inbursa</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
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<tr>
<td>ING</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
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<tr>
<td>Invercap</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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</tr>
<tr>
<td>IXE</td>
<td>IP</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Metlife</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Principal</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Profuturo</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
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<tr>
<td>Santander</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
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<td>XXI</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Source: CONSAR 2006.

YES: Petition approves, IP: Petition in process, NO: No petition posted.
When the VaR approach was adopted and more flexibility of investment regime was introduced, CONSAR strengthened the regulation and supervision of risk management and investment procedures of Siefores, significantly changing a range of related standards. The main modifications were made to accounting, valuation, custody, and prudential regulations and the required procedures for risk management.

**Impact of the Changes in Regulation**

Afores have been cautious while learning about the new investment alternatives and slow to invest in the new types of instruments. However, the slow movement towards the new instruments is also due to the relatively high interest rates on public debt that make it difficult to find alternative investments with comparable yields. For similar reasons, international diversification has been limited, a result that has been reinforced by uncertainty with respect to the tax treatment of foreign investment. In the case of variable-income instruments in general, both domestic and international, investing in structured notes is expensive and the cost is paid by the manager rather absorbed through the expenses of the fund, creating further disincentives. In the case of indexes (ETFs, trackers), even though the costs are not high, they are also paid by the manager and not the fund, providing limited incentives for Afores to pursue this approach. The alternative of buying specific instruments to replicate an index is also somewhat complex.

A change in regulation in December 2005 allowed Afores to charge the expenses of these low-cost index funds to the pension fund; in 2006, as noted above, Afores were allowed to invest in equity without capital protection. As shown in figures 5.1 and 5.2, this had an important impact on the behavior of the managers, and investment in variable-income instruments has begun to increase. However, it is still too soon to assess the real impact of the new regulation. In September 2005 the Basic Siefore 2 funds had allocated just 0.38 percent of their assets to domestic variable-income instruments: by September 2006 this percentage increased to 2.03 percent for domestic and 6.44 percent for foreign investment. It is likely that managers will continue searching for higher-yield alternatives, within the room allowed by the VaR ceilings, to arrest the decline in real returns shown in figure 5.3.

With respect to derivatives, the notional value of investment on these instruments was about 60 billion pesos (US$6 billion) to June 2004 and 137 billion pesos (US$13.7 billion) by the end of that year. From that amount, more than 50 percent were Tasa de Interés Interbancaria de
Equilibrio (TIIE) futures in the Mercado Mexicano de Derivados (MEXDER); the balance are dollar contracts, Libor, and swaps of interest rates. As of February 2006, the Basic Siefore 1 funds had almost 225 billion pesos (US$23 billion) invested in derivatives, while Basic Siefore 2 had a total investment in derivatives of 4.60 trillion pesos (US$460 billion).
Risk-Based Supervision Today

This section provides a description of how the Mexican RBS system is being implemented. In addition to the regulatory developments described above, this implementation required changes in the organization of CONSAR and the development of new procedures for supervision.

Organization of CONSAR

CONSAR, created in 1995, is the supervisory agency for the saving systems for retirement in Mexico. It is governed by two bodies: the Advisory Committee and the Government Board. Both groups include representatives from the government, employees, and employers. The Advisory Committee has 19 members, 6 representing employees, 6 representing employers, and 7 representing the government. The Government Board has 15 members, 12 representing the government, 1 representing employers, and 2 representing employees. Government members of the board are usually in important positions in Mexican public institutions; Advisory Committee government members are ex officio and work for specified public institutions.

The responsibilities of the Government Board include licensing new Afores or Siefores, mandating supervisory action, issuing norms for the investment regime (with the approval of the Advisory Committee), establishing the commission structures that can be charged to affiliates...
(considering the opinion of the Advisory Committee), assessing regulatory violations, determining penalties, and imposing disciplinary measures for staff of market participants that infringe certain rules. The Advisory Committee is consulted on any policies applicable to the retirement system; approving, rejecting, or closing down any Afore or Siefore; and removing key personnel from the Afores and Siefores. The Advisory Committee provides its opinion about the investment regime and commission structure and monitors the industry to control potential conflicts of interest or monopoly practices. CONSAR decisions have to be approved first by the Advisory Committee and then by the Government Board.

CONSAR reports to the Congress every six months regarding supervisory activities that have taken place and any relevant information about the system. It also informs the public about the benefits of the system and the way in which it operates.

CONSAR has undertaken some internal changes to effectively implement the new more-risk-oriented approach to supervision. These include a reorganization, the development of better practices to hire and train staff, improvements in information technology, greater financial autonomy, and enhanced transparency. Experts from the World Bank have provided advice on changes to the organization’s structure—most notably a clearer separation between technical specialties and complementary and support functions.

The new organizational structure of CONSAR includes three vice-presidencies: Legal, Operations, and Finance as shown in figure 5.4. More efforts are being focused on supervision of risk due to the increased flexibility of the investment regime. The Operations Division focuses as much on the link to Procesar as on the Afores because of the role that Procesar (and IMSS) plays in collections, benefit payments, and the transfer process.

**Methods and Procedures**

Until 2003 CONSAR’s supervision focused on operational issues. Supervision was limited to determining if transactions in the different operational processes were done in accordance with applicable norms. Although this model was successful in allowing the system to achieve a level of operational maturity, it was not well suited for dealing with the growing complexity of the system. Consequently, in 2004 CONSAR adopted a new supervision strategy, based on the management of operational and financial risks, while retaining some supervision of information
flows. The new approach reduces the emphasis given to the supervision of the information flows and integrates this with information from onsite audits (CONSAR 2006).

This model involves a scoring system comprising three modules: operations, internal controls, and financial performance. For the operations module, eight processes are assessed: registration, transfer, revenues, withdrawals, attention to the worker, promotion, information technology, and funds investment. For internal controls, planning, implementation, and processes monitoring, as well as management of the information derived from internal controls, are evaluated. For financial performance, attention is given to returns, solvency, and the Afore’s liquidity.

Each process is divided in subprocesses, and risk factors for each subprocess are identified. Risk factors are divided into three types of elements:

- procedures: to evaluate the quality of the process documentation
- controls: to evaluate the evidence with respect to the compliance with the documentation
- structure: to consider the size and organization of the Afore.

For each risk factor, and for each one of its three dimensions, a score is assigned: 1 for low risk, 2 for medium risk, and 3 for high risk. Additionally, the score assigned is multiplied by an index that goes from 1 to 1.5, depending on the number of irregularities detected. The combination of
the different qualifications allows the calculation of an implicit risk level indicator at the various levels: subprocess, process, module, manager, and the overall system.

With the implementation of this approach in 2005, it was observed that internal controls are the main source of operational risk. Other significant risks arise from the receipt and dispersion of contributions and from information technology. The supervision process has therefore focused on these most critical areas and become oriented to motivating managers to correct problems in order to avoid being sanctioned.

CONSAR is in the process of preparing a system of early warnings that consists of indicators of potential problems in different operational processes. CONSAR has implemented automated systems that allow it to supervise different operational processes, including the following:

- distribution of the resources to the individual accounts: the automatic processes permit CONSAR to verify for each worker whether the employer has paid the amount to the individual account, whether the amount contributed by the federal government (cuota social) is correct, and whether the commissions charged are correct
- Afore’s accounting, with a particular interest in the special reserve
- transfers among administrators.

Technological, legal, and outsourcing risks are also part of the operational risks. A new regulation published on February 1, 2006, gave the industry participants until July 2007 to implement the model and produce their first information report. The new regulation requires a methodology and an operational risk management model to classify the processes and subprocesses, define the respective risk factors, register the losses in a database when they happen, and calculate the expected damage associated with the occurrence of any event. The database information is sent to CONSAR every three months.

For the Siefores, operations with securities are fully supervised. All quotations and operations agreements must be recorded and maintained for a period of six months and two years, respectively. All operations should be appropriately registered, documented, and daily validated to verify that the Siefore has sufficient resources to meet all of its operations.

In terms of financial risks, in the early stages when the investment regime was very restrictive, the supervision of compliance was made through the accounting information that the Afores sent to CONSAR. Given the financial markets conditions, the relative size of the pension
funds, and the reduced number of alternatives to investment, supervision based on the collection of accounting data was considered sufficient. As the system became more sophisticated, a new focus on risks instead of accounting data became imperative.

The new regime that allows for investment in foreign instruments and capital-protected variable-income instruments is now monitored on a daily basis. CONSAR receives daily information about all transactions and prices undertaken by the Siefores. CONSAR’s information systems have been upgraded to enable to the processing of the greater volume of information. As the number of funds doubled, it was necessary to reduce the time of supervision per fund, which demanded increased efficiency.

CONSAR’s primary financial risk supervision tool is the historical VaR introduced in 2002. This is a market risk limit, measured through the estimation of the maximum value of potential daily loss within a specified confidence interval. Although there are a number of methodologies for the VaR estimation (most notably T empirical and parametric), CONSAR has decided to adopt an empirical estimation based on historical values and price movements. This approach requires fewer assumptions, is comparable among participants, and is easier to calculate and implement. More details about the calculation of the VaR can be found in the next section.

In terms of offsite financial supervision, to ensure greater automation, CONSAR has invested significant resources in certain activities done on a daily basis. These include: checking compliance with the investment limits, checking portfolios against the records of the Central Deposit (INDEVAL), computing the VaR, ensuring correct pricing of Siefore’s investments, and crosschecking these with the Bolsa Mexicana de Valores (BMV).

Additionally, some activities are carried out less frequently, including: publishing an accounting of the investment portfolios of each Siefore on a monthly basis, publishing financial statements on a monthly basis, reviewing the policy and procedure manuals for risk management, reviewing the information provided by Afores to affiliates, and requesting risk management assessment from external auditors.

Traditional onsite tools for RBS are also used, such as certifications including simulations and stress testing, onsite inspections, and development of clear risk assessment procedures.

There are three types of inspection visits.

- *Risk visits* verify that there exists an independent unit capable of measuring, evaluating, and managing financial risks.
• **Investment visits** verify that the investment operations function under the best international standards and practices.

• **Conflicts of interest visits** determine if there are potential or actual conflicts of interests, particularly with other companies with equity relations.

During the conduct of these visits the fund’s monitoring, certification, risk analysis, and evaluation procedures are documented to determine that the required internal controls are present in each area and functioning to ensure the quality of the products.

Additionally, CONSAR verifies by means of onsite supervision compliance with other requirements: new regulations, proper transfer to workers, measures and procedures in place to detect and prevent money laundering, alignment of the fee structure with regulations, effective functioning of the risk unit, operational systems to work with derivatives, and correct payment of benefits.

**Assessing a Fund’s Riskiness**

Pension funds in Mexico are required to compute a VaR on a daily basis for each Sierfore. To cover losses within the range of the permissible VaR, each Afore must create a reserve equal to 1 percent of the value of the fund. CONSAR is currently evaluating whether the reserve should vary according to the risk level of the fund. The reserve level is verified on a daily basis.

If there is a loss for the fund that is due to the violation of the regulations, the Afore has to use this reserve to compensate affiliates for that loss. The reserve has to be reconstituted so that the required amount is once more in place.

The VaR is computed by using historical information of prices provided by price vendors and valuation agencies. The price vendor provides information of prices for the instruments allowed for pension fund investment. The 500 days previous to the day at which the VaR is computed are considered as possible scenarios, and the prices of these days give a price distribution. These prices embody different risk factors that are considered for valuation. The valuation methodology has to be certified by the CNBV. The methodology used to compute the VaR is shown in annex 5.1.

CONSAR has developed operating indicators to complement the VaR that trigger supervisory actions such as internal reports or questionnaires to the Afore’s employees responsible for investment and risks. These early-warning requirements are:

• **Preventive alarms**: These analyze the difference between the Monte Carlo VaR (representing a parametric methodology that uses simulated
scenarios and that adjusts rapidly to changes in the expected volatility) and the historical VaR. The size and direction of the differences can anticipate tendencies or possible inconsistencies in the VaR estimations.

- **Early alarms**: These are used to estimate the probability that a new scenario will generate a violation of the VaR limit, as a function of how much time has passed since the first 12 observations and the number of scenarios inside this group that violate the regulatory limit.

- **Stress tests**: These estimate what would occur to the VaR in the event of some catastrophic historical scenarios. This tool minimizes the probability of underestimation of the market risk in periods of stability or low market volatility.

- **Transactions indexes**: These provide indicators that reflect the level of transactions undertaken by a Siefore with a speculative objective during a specified period. Because these transactions are inconsistent with the overall investment requirements for Afores, a high index triggers a deeper analysis. This analysis may involve the review of transaction records or questionnaires to responsible parties to determine the reasons for the transactions.

- **Financial-accounting validations**: Daily automatic monitoring is conducted to check consistency between the figures reported directly from the Afores operational systems and the custodian of the assets with the accounting information reported to CONSAR. This permits CONSAR to verify the compliance with the investment regime and identify potential problems.

**Human Resources Policies**

Mexico has a career civil service that is designed to ensure equality of opportunity in access to public positions based on merit and the development of the public service for the society’s benefit. The policy of having professional public employees seeks to guarantee delivery of quality public services, continuity of policies and programs, and legal security. One aim is to ensure the continuity of staff despite political changes every six years. Salaries within CONSAR are competitive with respect to industry or other alternative jobs. Although the salaries cannot be freely set, the scale to which CONSAR has to adjust salaries is relatively high.

CONSAR has 181 staff members, of whom 132 are of mid- and upper-level grades. Among the professional staff members, 121 have participated in the processes to obtain the status of public servant. With respect to training, 84 percent of the workers who worked the entire year of 2005 for CONSAR received at least 40 hours of training to improve their
technical or management skills. CONSAR’s objective is that 100 percent of CONSAR’s personnel will be certified as career public servants in subsequent years.

Preliminary Evaluation of Risk-Based Supervision in Mexico

The establishment of a primarily risk-based approach to the supervision of pension funds in Mexico is a relatively recent development. It therefore remains far too early to make any conclusive judgements about its long-term impact. Some initial observations about the potential effects, however, can be made.

Overall Move to Risk-Based Supervision

The overall process to implement a risk-based system for the supervision of the pension funds industry in Mexico originates with the introduction of the VaR limit in 2002. The approach has been further developed with the ongoing introduction of requirements for Afores to establish mechanisms to manage and monitor risks and the requirement that these systems be governed, certified, and supervised by CONSAR. Investment regulation has changed significantly during the last five years, moving significantly toward the control of risk by through appropriate risk management instead of quantitative restrictions. The easing of investment restrictions has slowly started increasing the portfolio diversification of pension funds. The decisions about this change in approach have been taken by the CONSAR’s board, which has significant power in determining investment limits. The changes have led away from investment in government securities, which could make it more difficult for the government to finance fiscal deficits. This shift could create a potential conflict of interest for the Minister of Finance who is president of CONSAR’s board—a situation that could be remedied by more independence for CONSAR.

As new and more-complex investment instruments were allowed, special certifications were required for the Afores to use those instruments. Such certification is not compulsory for the Afores. As a result some funds are adopting sophisticated approaches, while others only adopt basic investment strategies. The choice of strategies will need to be evaluated over time to ensure that affiliates are not disadvantaged by the direction chosen by the Afore. There is a general presumption that the more-sophisticated approaches will be more beneficial; if this proves to be the case, it may be necessary to require all the Afores to seek certification to move toward more-sophisticated approaches.
A final issue with respect to financial risk regulations relates to conflicts of interest. There are perceptions in the industry that the regulations are not sufficiently detailed or transparent, conflicts are not adequately supervised, and sanctions are not clear or explicit. CONSAR is working to strengthen regulations in these areas. This is especially relevant in the case of Mexico because of the importance of financial conglomerates within the pension system. Under a more-flexible investment regime, conflicts of interest arise as an important issue to address in this environment.

The implementation of an RBS framework can help to make the pension system more efficient and effective. However, in Mexico the RBS approach has been implemented on top of a heavy compliance-based regulation, which might impose an excessive regulatory burden. There appears to be a transition period, and it is expected that compliance regulation will be relaxed gradually, especially for those Afores demonstrating effective risk management.

CONSAR has been especially cautious in relaxing regulations because operational risks in the industry are particularly high. One of the main reasons for this is that people have little interest in their pension savings and do not exercise a diligent control over the providers. The recently issued Circular 62 defines standards for appropriate risk management that require the Afores to define critical processes, estimate the probability of a failure in those processes, and assess the financial impact the failures might produce. CONSAR has its own framework to evaluate risk and carry out inspections.

Three initial inspections of the Afores were made by CONSAR before it finalized its circular on RBS: financial, operational, and technology risks were assessed. This preliminary assessment done by CONSAR allowed it to detect weaknesses in the Afores that could be addressed in the circulars. One of the problems observed was that the role of the compliance officer was not well defined and significant differences were found in different Afores. In response, CONSAR decided that it needed to develop a new circular to address these issues.

It is worth noting that the RBS methodology that has been designed is not related to any capital requirement. CONSAR is examining how to link capital requirements to the level of risk in order to better align incentives. The problem is that this link would introduce volatility on reserves, which might increase operational costs and makes the policy procyclical.

In any case, specific actions are taken to pursue adequate risk management by Afores. An external auditor evaluates risk management on an annual basis. Additionally, once a year CONSAR does its own assessment and uses the results to assign resources for supervision. CONSAR weights
the risk rating derived from these inspections by the size of the Afore to assess systemic risk.

Finally, the one process that is fully regulated by CONSAR—switching between Afores—would benefit from more secure procedures. Currently, an affiliate who wants to switch has to sign a form, and the signature is validated by comparing it with a copy of the identity card. However, this card can be easily forged. Additionally, record keeping by Procesar of affiliate balances could be improved to increase efficiency and facilitate the transfer process among Afores.

In summary, Mexico has made significant progress toward adopting a RBS approach. Although specific issues need to be addressed, in general, regulation has followed the direction in which international financial regulation has been moving. The main question that remains to be answered is how to move forward to a risk-adjusted capital requirement.

**VaR Approach**

Mexico adopted a VaR limit that is imposed in conjunction with strict quantitative portfolio restrictions. Although these limits have been relaxed, over time they remain an important part of the overall regulatory scheme. The VaR limit that is now imposed is based on historical data utilizing price information from the preceding 500 days to estimate the potential daily losses of the portfolio. The limit is a loss of 0.6 percent for the more conservative (and original type of fund) Basic Siefore1 and 1 percent for the more recently permitted and less restrictive Basic Siefore 2, with a 97.5 percent confidence interval for both calculations. If the VaR is violated or any other regulation is not complied with due to the Afores actions, and there is a loss for the fund, the loss must be compensated by using resources of the special reserve, equivalent to 1 percent of the fund value that the Afore invests in shares of the Siefore.

According to CONSAR’s regulation, Afores have to compute and comply with the VaR limit daily and also complete a stress test of the VaR and do a Monte Carlo VaR to further evaluate risk. Additionally, Afores must have stop-loss rules, such that specific measures would be taken if losses are incurred above certain level. The regulation is not specific with respect to how to manage risks, except for the historical VaR limit. However, CONSAR has introduced a certification process for using derivatives, capital-protected instruments, and foreign instruments requiring proper risk management, as noted. Each Siefore must have a manual describing all the procedures, including computing marginal VaRs for assessing risk of investing in particular types of instruments.
CONSAR checks this manual, but the information it contains is not made public.

The application of a VaR approach for pension funds is controversial; there are valid arguments against the application of a short-term risk measure for long-term investors such as pension funds. However, there is no consensus on a suitable alternative measure. The basic idea behind the control of risks through a VaR limit is to allow pension funds to construct portfolios closer to the risk-return efficient frontier without allowing them to move above a certain risk threshold. The reasoning for limiting risk for pension funds is related to the usual principal-agent problem that arises when there is delegation of investment decisions. In the case of pension systems such as Mexico’s, this problem is significantly more important because participation in the funds is compulsory. Additionally, even if the members of the funds are interested and able to act on information about the portfolio, the costs of being informed are high because of the complexity of the information. Moreover, in Mexico, as in many other countries, the government provides explicit guarantees that justify limiting risk. Even if informed investors are able to induce the managers to invest according to their risk-return preferences, these preferences might diverge from the preferences of the government providing the guarantees. Finally, the government has the additional goal of reducing volatility of replacement rates across cohorts.

Limiting risk by imposing quantitative restrictions is not a free lunch. Berstein and Chumacero (2006) quantify the costs of investment limits for Chile, arguing that 21 years after the reform, on average, they amount to around 10 percent of the account balances of 2002. Because of concerns about these costs, investment restrictions in Chile have been relaxed significantly. For a number of years, the investment regime has been more flexible than the current regulation in Mexico. Therefore, it could be assumed that the investment regime in place in Mexico imposes a cost on the pension funds. In general, in a Capital Asset Pricing Model (CAPM) framework, quantitative limits impede the maximization of returns for a given risk level, and the efficient frontier is lower than the unrestricted frontier. Ideally it is preferable to restrict risk without moving to an inferior efficient frontier.

CONSAR has estimated the efficient frontiers for pension fund investments that show that, after the implementation of the VaR approach and the associated process of affording more flexibility in pension funds investments, the performance of pension funds has moved toward the efficient frontier with combinations of higher rates.
of return and higher volatility. The results of CONSAR’s analysis are shown in figure 5.5.

This analysis assumes that risk for pension funds is equivalent to short-term volatility. However, this is not necessarily the case. There is no consensus in the literature with respect to the suitability of using the VaR approach for long-term volatility, or which is the best measure for long-term risk in the case of pensions.

The most common rule to compute long-term VaR is the square-root rule, which is true under restrictive assumptions with respect to the distribution of returns. Even under these conditions the right VaR measure would imply an explicit consideration of the term of investment to establish a limit to volatility. This suggests that more risk should be tolerated the farther the investment horizon.

Conclusions and Recommendations

Supervision of financial institutions has to be as dynamic as the industry supervised. This is a challenge that RBS has tackled adequately. Mexico is starting this process by following international standards.
At the same time the Mexican regulator has been moving toward an RBS framework, the investment regime has been changed to provide greater flexibility for pension funds managers. The goal of these changes has been to enable Siefores to obtain higher returns for their affiliates while managing risk better. In the case of Mexico this is important not only for pensioners but also for the fiscal stance of the government, given the guarantees offered to participants in this system.

Expanding the set of instruments in which pension funds may be invested is crucial to obtain an adequate combination of risk and return. Even if important restrictions remain, it seems that there is a significant potential gain in diversification of risks under the new regulation. Importantly, more flexibility in quantitative investment restrictions can be provided in conjunction with a close supervision of risks and adequate information disclosure. This combination of relaxing other restrictions in parallel with the introduction of imposing risk management requirement and overall portfolio risk limits is the approach that Mexico has adopted. The safeguarding of compulsory saving is crucial for the sustainability of the private pension system. The degree of freedom that pension fund managers have in terms of investment in derivatives is noteworthy; therefore it is important to assess the effectiveness of the VaR approach in limiting potential risks.

This VaR approach being adopted by Mexico is an innovative approach to managing risks in DC schemes. A priori, this framework appears to be superior to quantitative restrictions in terms of allowing pension funds to move along the risk-return trade-off closer to the efficient frontier. However, a question that remains to be answered is whether this is the appropriate risk measure for long-term investment of pension funds.
Annex 5.1

Value at Risk Methodology

The price of the allowed instrument $j$ at day $h$ is expressed in terms of a range of risk factors; there can be $k$ risk factors, $F_1, F_2, \ldots, F_k$—which may be, for example, inflation, interest rate, or exchange rate, depending on each one of the instruments that will be evaluated. The price is expressed in terms of these factors through the valuation formula:

$$P_j^h = f(F_1^h, F_2^h, \ldots, F_k^h)$$

The specific daily procedure to compute the VaR is the following:

- Historical information of all risk factors is collected and has to be available when the VaR is computed. This information is provided by the price vendors. An example of a risk factor would be the 91-days interest rate; Mexico’s benchmark interest rate CETES is used to find the price of that CETES; values of the interest rate for 500 days are needed. When a new instrument enters the portfolio, it might embody a new specific risk factor. In that case historical information would have to be collected before computing the VaR.

- Afterward it is necessary to find the daily variation of each of these risk factors for the 500 days before the valuation date. In the case of the CETES the division of each date interest rate by the previous date would give the daily change on interest rate. By multiplying the value of the risk factor at the date of valuation by each of the 500 possible changes on each of these risk factors, a sample of 500 possible observations for the risk factor value is obtained. This procedure is done by the price vendor.

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<tr>
<th>Risk factor</th>
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<th>Generated observation</th>
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<td>$F_1^h$</td>
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<tr>
<td>$F_1^{h-1}$</td>
<td>$\frac{F_1^h}{F_1^{h-1}}$</td>
<td>$\frac{F_1^h}{F_1^{h-1}} \times F_1^h$</td>
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<tr>
<td>$F_1^{h-2}$</td>
<td>$\frac{F_1^{h-1}}{F_1^{h-2}}$</td>
<td>$\frac{F_1^{h-1}}{F_1^{h-2}} \times F_1^h$</td>
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• From the generated risk factor observations, the 500 possible prices are computed for each of the instruments in the Siefores’ portfolio. The pricing formula for each instrument is used in this stage. These price formulas are the standard in the literature and set by the price vendor. In the case of capital protected instruments, the underlying assets are prices for equity; for the bond, the VaR is computed as any fixed income; in the case of derivatives a variation of the Black and Scholes formula is used.

• With those prices a $500 \times n$ price differences matrix is constructed, where $n$ is the number of assets allowed in the portfolio of the Siefore. The $(i,j)$ element of this matrix will be the following:

$$CP_i^j = P_i^j - P_j^h$$

for $i = 1,2, \ldots, 500$ and $j = 1,2, \ldots, n$

$P_i^j =$ price of the allowed instrument $j$ under the scenario $i$;

$P_j^h =$ price of the allowed instrument $j$ at day $h$;

$CP_i^j =$ difference between the price of the allowed instrument $j$ at scenario $i$ and the price of the same instrument at day $h$.

• With all the resulting possible prices the value of the portfolio is computed by the valuation agency. The information provided by the valuation agency is the multiplication of the price differences provided by the price vendor by the number of instruments and contracts of each Siefore. Through this procedure, it is found a set of possible changes in the value of the funds.

$$\left( \begin{array}{cccc}
CP_1^1 & CP_2^1 & \ldots & CP_n^1 \\
CP_1^2 & CP_2^2 & \ldots & CP_n^2 \\
\vdots & \vdots & \ddots & \vdots \\
CP_1^{500} & CP_2^{500} & \ldots & CP_n^{500}
\end{array} \right) \times \left( \begin{array}{c}
NT_1^h \\
NT_2^h \\
\vdots \\
NT_n^h
\end{array} \right)_{n \times 1} = \left( \begin{array}{c}
PMV_1^h \\
PMV_2^h \\
\vdots \\
PMV_{500}^h
\end{array} \right)_{500 \times 1}$$

\[ NT_j^h = \text{number of contracts of the allowed instrument } j \text{ at day } h. \]

\[ PMV_i^h = \text{increase or decrease in the portfolio value at scenario } i \text{ for the portfolio at day } h. \]

- Then the 500 possible changes in the portfolio value for the next day are divided by the market value of the portfolio at day \( h \). This percentage change on the value of the portfolio is ordered from the lowest to the highest. This is the distribution of returns that the historical information provides.

- From the historical distribution, the VaR is calculated by the valuation agency at the desired confidence level, which in the case of Mexico is 5 percent (2.5 percent for one tail). Therefore, in this case the worst case number 13 of the distribution should be below 0.6\% for Siefore 1 and 1\% for Siefore 2 to comply with the regulation \( ((0.05/2) \times 500 \approx 13) \). This means that in a month the maximum loss would be around 2.7 percent of the fund (0.6 percent \( \times \sqrt{20} \)) for Siefore 1 and 4.5 percent for Siefore 2, if there is no mean reversion within the month. The VaR limit does not prevent losing the whole fund in one year, assuming again there is no mean reversion within a year. However, this is very unlikely.

The valuation agency must send to each valued Siefore and to CONSAR the 500 worst observations per portfolio as the amount and percentage of the Siefore's net assets.

**Notes**

1. The entrance of these small Afores with low fees supports the results of Aguilera and Velazquez (2005) that show that there are no significant economies of scale with respect to the Mexican Afore industry. Minimum efficient scale is reached with 800,000 affiliates, which is less than 2 percent of the total; accordingly, no decline of participants should be expected in the short run.

2. Mexico is a large country; this number of affiliates might imply a natural monopoly in a smaller country.

3. The minimum pension is equivalent to the minimum wage of 1997 adjusted for inflation; it is currently around 25 percent of the average wage.

4. Workers who have the option of choosing the old defined benefit upon retirement also take home cash payment for a fraction of the accumulated balance of their retirement account. The amount is calculated as that accumulated by the 2 percent contribution of the salary. For an average worker the cash payment can be almost 25 percent of the total balance in the account.

6. By law, valuation must be defined by the Valuation Committee, headed by CNBV. However, valuation regulations seem to be relatively liberal compared to other regulations that Afores face. This is an important issue, especially in the presence of illiquid instruments.

7. Investment limits for variable income and foreign instruments are set by the SAR’s law and therefore may not be modified by CONSAR’s board.

8. Investment on derivatives with no major restrictions on contracts is a special feature in Mexico; in general, pension funds invest on derivatives only for hedging purposes, subject to permitted underlyings, markets, operations and counterparties.

9. Given the instruments allowed for Siefores 1 and 2, the first is closer to a risk-free portfolio in the efficient frontier; however, as it is allowed to write derivatives, the level of risk might not be negligible (it must be pointed out that the leverage of derivatives is limited by the VaR limit).

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