tedious, of little benefit, might tend to repel the international readership, and could well have been relegated to the appendices.

Little emphasizes that a key ingredient of the reform, one that was expected to make a major contribution to reducing projected costs to the steady-state rate (by pursuing an expected real rate of return of the order of 3.8% p.a.), is the decision to invest the increasing cash flow resulting from the reform in the private markets. He explains in detail the process whereby political and stakeholder agreement on the principles was achieved. He also provides useful insights into the mechanics whereby the governance and investment operations of the emerging fund (which would become the largest pension fund in Canada) would be structurally and legally separate from government or political influence via the creation of an independent board which would engage professional management. Expert views on the merits of alternative investment policies are not neglected including argumentation on the feasibility of pursuing active management vs. index replication approaches.

The text deals with a complex system and its dynamics over its relatively short, but turbulent history, and Little does a commendable job of providing a comprehensive account. This reviewer would like to have seen more tabular displays and charts of the data, assumptions and projections that serve to inform and crystallize the narrative. Also, I found the frequent discussions of the jousting and posturing of political personalities, and the detailed accounts of a multitude of meetings, and interviews etc. a distraction, notwithstanding their relevance to the unfolding of the story. Also, in my view, there is room for much more in the way of analyses of the sensitivity of the various projections to drifting off course due to shocks to or parameter shift in respect of the more significant of the assumptions. Without these, it is difficult to assess the likelihood of the outcomes discussed throughout the text.

Fixing any future is a daunting challenge. This book looks at the Canada Pension Plan and the efforts to make it sustainable. Have they done so? In my opinion, it is too soon to say. Keep an eye open for the projections yet to come.

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Modeling Longevity Dynamics for Pensions and Annuity Business. Ermanno Pitacco, Michel Denuit, Steven Haberman and Annamaria Olivieri. Oxford University Press, 2009, ISBN 978-0-1995-4727-2, 400 pages. doi:10.1017/S1474747210000454

This book provides good coverage of longevity and mortality modeling from the basic mathematics to recently developed models as well as risk management. The theory presented is wide ranging, including topics such as deterministic annuity valuation and hedging using longevity bonds. Although the audience of the book is composed primarily of advanced undergraduate students, postgraduate students and practicing actuaries, the material presented is relevant to industry practitioners wanting an understanding of longevity risk models. The book requires a modeling background and an interest in understanding longevity models and applications. Furthermore, this book would be of interest to advanced economics and finance students as well as pension economists. Researchers with a background in pensions and insurance would also find this book a useful and well presented reference of the major issues attracting research efforts on longevity modeling.

Longevity risk and its modeling, although an area of actuarial research and practice for many decades and dating, as mentioned in the preface, back to the 1600's, has shown a significant increase in research interest in the last 15 to 20 years. This can be traced to the increased usage of life annuity products in pension plans due to the progressive shift from defined benefit to defined contribution plans. This has furthermore coincided with the ageing of the population around the world and the recognition that mortality risk, of which longevity risk is an element, cannot merely be managed through the law of large numbers as was traditionally the case. Pension funds and life insurers issuing annuity products with guarantees related to mortality have faced increasing costs and have had to apply more sophistication in the management of these risks. At the same time regulators are encouraging insurers to use internal models to quantify risk and assess risk based capital.

The book starts with a basic review of deterministic life annuity mathematics and annuity contracts, and covers basic actuarial models, including graduation and heterogeneity in mortality. This leads into a discussion of mortality trends for both the general population and insured lives based on Belgian data. An introduction to mortality forecasting follows, which includes the basic ideas underlying the Lee-Carter model as well as brief mention of issues such as cohort models and cause of death. Following that is a deeper coverage of age-period models based on the Lee-Carter and Cairns-Blake-Dowd models as well as a discussion of P-splines. Belgian data is again used for the application of the models. Uncertainty of projections, including confidence intervals and fan charts, are also briefly introduced. The models are then extended to cover age-period-cohort considerations with application to UK mortality data. Finally a substantial section, comprising over a quarter of the book, studies the risk management of longevity, including hedging, reinsurance, securitization as well as some pricing and solvency topics under the title of actuarial perspectives. There is a brief, and useful, listing of further references at the end of most chapters.

There are few books in the area of longevity modeling. A related text is the book by Moshe Milevsky entitled *The Calculus of Retirement Income* (Cambridge University Press, 2006) which provides a broad consideration of the economics of uncertainty in mortality. The actuarial texts are inadequate since the uncertainty usually presented is for lifetimes under the assumption of known future mortality rates and independent (and identically distributed) lives of the same age. This is not the case as evidenced by past experience and hence more sophisticated modeling and risk management techniques are required. This book would be an excellent text for use by professional actuarial associations. Longevity risk and its modeling should be given more prominence in the professional actuarial syllabus due to its increased relevance. Furthermore, this is an area of research and practice that other professionals are active in, including economists, risk management and insurance researchers and practitioners, as well as an increasing number of finance professionals. The book is at a level for professionals or researchers from these areas with a quantitative background.

The book's strengths are its widespread coverage from the basic to some of the more advanced aspects of longevity modeling. The analysis of the trends in mortality and longevity would have benefited from taking a broader perspective and providing an overview of experience in a wider range of countries. Issues around the projection of mortality and resulting uncertainty are also based on extrapolation from historical data and there is no substantial discussion of methods of considering future uncertainties not captured in historical data. It was at times surprising to note the authors' lack of consideration given to the underlying drivers of past mortality trends when the extrapolation of these trends was being advocated. Given the recent events in financial markets and reliance on credit risk models without a broader understanding of their limitations, coverage of the limitations of these models and how this could be managed would have been a valuable addition to a book such as this.

The products considered are guaranteed products and there is no discussion of alternative risk pooling arrangements such as group self annuitization. There is substantial coverage of quantification of longevity risk and solvency issues as well as capital market products to manage the risk. In contrast to a very short discussion of the impact of systematic longevity risk improvement on pricing, a crucial aspect of writing guaranteed life annuity business (unless with-profit based).

The book is not a research monograph. There are many topics in longevity modeling not covered in the book. The financial approach to pricing that has been explored in research is only mentioned in a few paragraphs although references are included. This deserved more prominence and coverage particularly with the development in financial markets such as q-forwards and longevity swaps.

The authors have done an excellent job in bringing together coverage on topics of current interest and providing a modern approach to mortality modeling not found in the actuarial textbooks.

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Lessons from Pension Reform in the Americas. Stephen J. Kay and Tapen Sinha, eds. Oxford University Press, 2008, ISBN 0-19-922680-6, 425 pages.
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Why is it now time to draw lessons from pension reform in the Americas? One reason is that in pension economics research, with its long-term cohort and life-cycle focus, data availability sets the agenda. In 2002, the University of Chile's Microdata Center started collecting a new longitudinal survey, the Social Protection Survey (SPS), to evaluate the effects of the 1981 privatization of the pension system. Before the SPS, little micro-level data were available on labor supply and savings accumulation under private-account, multi-pillar programs. In light of this new information, this volume assembles several case studies of pension reforms through the continent, together with discussions of the pension design questions of the future.

The book opens with an instructive chapter on the SPS findings. The fact that the household survey is linked to administrative data allows Arenas de Mesa and his co-authors to compare self-reported savings accumulations with the corresponding numbers on record. Results show that Chileans over-report their months of contribution by 15 to 30 %, and only 40 % of them know the value of their pension assets. The survey also reveals major gaps in coverage, especially for women, and scant knowledge of the systems' rules on the part of its affiliates.

The volume also provides a comprehensive account of the diversity of American experiences with pension reform, from Costa Rica to the United States. A fascinating picture emerges of the combination of ideological, political, and institutional mechanisms driving the reform process. Before micro-evidence was available, Chile's pension reform had been given credit for many of the country's achievements including fiscal solvency, high returns on pension assets, financial markets development, high growth, and more. In his chapter, Weyland argues that this prestige and a lack of pension reform expertise led policymakers throughout the continent to import the Chilean model, sometimes with too few adjustments. World Bank studies including the influential *Averting the Old Age Crisis* (1994) were also widely seen as endorsing Chile's example, a perception that James, one of the original authors, sets out to refute.

The remainder of the book offers an uneven set of studies on implications of pension design. Coverage-related questions are barely touched on: can we improve incentives for participation? If not, can we rescue uncovered populations through minimum pension schemes, and at what fiscal cost? Will safety nets crowd-out capitalization programs? By contrast, gender equity issues receive an in-depth treatment. For instance, James, Cox Edwards and Wong argue that privatizations worsened gender inequalities when considering only individual annuities, but that the effect of joint annuities, survivorship benefits and public safety nets reverses that result. In her chapter, Michelle Dion argues convincingly that many reforms reduced women's own pension claims and increased their dependency on their husbands' pension or on poverty programs.

In short, while the collection overlooks some important topics, it does offer necessary historical and conceptual elements to understand new directions in the pension reform debate in both North and Latin America.

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