

Contents

Preface	xv
1 Investment Assets Held by Pension Funds	1
1.1 Money-market securities	1
1.2 Bonds and loans	5
1.3 Shares	10
1.4 Collective investment vehicles	13
1.4.1 Unit trusts and open-ended investment vehicles	13
1.4.2 Investment trusts	15
1.4.3 Insurance products	16
1.4.4 Exchange-traded funds and guaranteed growth funds	17
1.5 Real assets	18
1.5.1 Property	18
1.5.2 Land	21
1.5.3 Collectibles	21
1.6 Derivatives	22
1.6.1 Forwards and futures	22
1.6.2 Options, warrants and convertibles	26
1.6.3 Swaps	32
1.6.4 Forward-rate agreements	36
1.6.5 Synthetic securities	37
1.7 Alternative investments	37
1.7.1 Public market strategies	38
1.7.2 Private market or private equity strategies	44
1.7.3 Natural resources	47
1.8 Socially responsible investment	48
1.9 Global custody	49

1.10	Different asset characteristics and uses	51
1.10.1	Asset characteristics	51
1.10.2	Asset uses	52
1.11	Conclusions	61
	Questions	61
	Appendix: Standard deviation, value-at-risk and correlation	62
	References	64
2	Personal Finance: The Allocation of Personal Wealth to Different Asset Classes	67
2.1	Introduction	67
2.2	Modelling the allocation of personal wealth to different asset classes	70
2.3	Conclusions	74
	Questions	75
	References	76
3	Corporate Pension Finance	77
3.1	The valuation of pension liabilities: differences between the actuarial and economic approaches	77
3.2	Pensions and the company balance sheet: differences between the accounting and economic approaches	79
3.3	The asset allocation of the pension fund	83
3.3.1	A fully funded pension fund	84
3.3.2	An underfunded pension fund	87
3.3.3	A pension fund with liabilities linked to earnings growth	87
3.3.4	An insured pension fund	88
3.4	The relationship between the pension fund and the sponsoring company's profitability, credit rating and share price	91
3.4.1	Profitability	91
3.4.2	Credit rating	92
3.4.3	Share price	93
3.5	Conclusions	96
	Questions	98
	References	99

4 Defined Contribution Pension Schemes – The Accumulation Phase	101
4.1 The optimal design of DC schemes during the accumulation phase	101
4.1.1 Stochastic pension scheme design	102
4.1.2 Risk factors	104
4.1.3 Control variables	111
4.1.4 Simulation output	114
4.1.5 Choosing the optimal asset-allocation strategy	122
4.1.6 The trade-off between risk and contribution rates	123
4.2 Charges	124
4.2.1 Types of charges	124
4.2.2 Reduction in yield	125
4.2.3 Reduction in contributions	127
4.2.4 Changing charging structures and the impact of hidden charges	130
4.3 Persistency	132
4.3.1 Persistency rates	132
4.3.2 Adjusting reported charges for policy lapses	133
4.4 Conclusions	134
Questions	135
Appendix: Charges	137
A.1 Reduction in yield	138
A.2 Reduction in contributions	139
A.3 Adjusting for lapse rates	140
References	142
5 Defined Contribution Pension Schemes – The Distribution Phase	145
5.1 Annuities	145
5.1.1 Purchase arrangements	146
5.1.2 Coverage	146
5.1.3 Variations	147
5.1.4 Other features	147
5.1.5 Payment terms	148
5.1.6 Decomposition of annuity charges	152
5.1.7 Mortality drag	159

5.2	The optimal design of DC schemes during the distribution phase	161
5.2.1	Alternative distribution programmes	162
5.2.2	Stochastic pension scheme design	166
5.2.3	Simulation output	174
5.2.4	Impact of poor health	183
5.2.5	The annuitisation decision	183
5.3	Conclusions	187
	Questions	188
	References	189
6	Defined Benefit Pension Schemes	191
6.1	Types of defined benefit scheme	191
6.2	Defined benefit liabilities	194
6.3	The option composition of pension schemes	196
6.4	Valuing the options	199
6.5	The pension scheme preferences of members, sponsors and fund managers	206
6.6	Conclusions	208
	Questions	209
	References	209
7	Pension Fund Management	211
7.1	The role of a pension fund	211
7.2	The functions of a pension fund manager	217
7.3	Fund management styles	218
7.4	Different fund management strategies for defined benefit and defined contribution schemes	220
7.5	The fund manager's relationship with the trustees	224
7.5.1	Determining the trustees' objectives and constraints	224
7.5.2	Determining the trustees' benchmark portfolio	225
7.5.3	Investment-risk budgeting	231
7.6	Passive fund management	233
7.7	Active fund management	237
7.7.1	Active share-fund management	238
7.7.2	Active bond-fund management	243
7.7.3	Mixed active-passive fund management	248
7.8	Asset-liability management	250
7.8.1	Managing surplus risk	253

7.8.2	Managing contribution risk	259
7.8.3	Key ALM strategies	260
7.9	The Myners Review of institutional investment	274
7.10	Conclusions	280
	Questions	281
	Appendix 7A: Investment-objectives questionnaire	283
	Appendix 7B: Derivation of the optimal contribution rate and asset allocation in a defined benefit pension fund	287
	References	290
8	Pension Fund Performance Measurement and Attribution	293
8.1	<i>Ex post</i> returns	293
8.2	Benchmarks of comparison for actively managed funds	296
8.3	Risk-adjusted measures of portfolio performance for actively managed funds	299
8.3.1	Performance measures based on risk-adjusted excess returns	300
8.3.2	Performance measures based on alpha	302
8.4	Performance attribution for actively managed funds	305
8.5	Liability-driven performance attribution	310
8.6	Realised investment performance	314
8.6.1	Investment performance of DC funds	314
8.6.2	The investment performance of DB funds	317
8.7	Performance-related fund management fees	324
8.8	How frequently should fund managers be assessed?	326
8.9	Conclusions	328
	Questions	329
	Appendix: Deriving the power function	330
	References	332
9	Risk Management in Pension Funds	335
9.1	The objective of hedging	335
9.2	Hedging with futures	336
9.2.1	Hedging with stock-index futures	338
9.2.2	Hedging with bond futures	340
9.2.3	Hedging with currency futures	343

9.3	Hedging with options	344
9.3.1	Hedging with individual stock options	344
9.3.2	Hedging with stock-index options	350
9.3.3	Hedging with bond options	351
9.3.4	Hedging with currency options	351
9.4	Hedging with swaps	352
9.5	Hedging longevity risk	354
9.5.1	Longevity risk	354
9.5.2	A new hedging instrument: longevity (or survivor) bonds	358
9.5.3	The implications of longevity bonds	358
9.5.4	Mortality-linked derivatives	362
9.6	Conclusions	363
	Questions	363
	References	364
10	Pension Fund Insurance	367
10.1	The Pension Protection Fund (PPF)	367
10.2	What the Pension Protection Fund can learn from other financial institutions and compensation schemes	368
10.2.1	The financial regulation of banks	369
10.2.2	The financial regulation of life assurers	374
10.2.3	Financial Services Compensation Scheme	382
10.2.4	The financial regulation of pension funds	383
10.2.5	Pension Benefit Guaranty Corporation (PBGC)	388
10.3	The risks facing the PPF	390
10.3.1	Moral hazard	391
10.3.2	Adverse selection: bad drives out good	392
10.3.3	Systemic risk	392
10.3.4	Political risk	394
10.4	Dealing with these risks	394
10.4.1	An equity claim against the sponsoring company	395
10.4.2	A maximum payout	395
10.4.3	Risk-based premiums linked to the level of underfunding	395
10.4.4	A funding standard for schemes	396

10.4.5	Close supervision and the public exposure of companies that underfund their schemes	397
10.4.6	Comment	398
10.5	Conclusions	398
	Questions	399
	Appendix: The Marcus (1987) and Vanderhei (1990) Models	400
	References	408
Appendix A: Financial Arithmetic		411
A.1	Future values: single payments	411
A.1.1	Simple interest	411
A.1.2	Compound interest: annual compounding	412
A.1.3	Compound interest: more frequent compounding	412
A.1.4	Flat and effective rates of interest	414
A.2	Present values: single payments	414
A.2.1	Present values: annual discounting	415
A.2.2	Present values: more frequent discounting	415
A.3	Future values: multiple payments	416
A.3.1	Irregular payments	416
A.3.2	Regular payments	417
A.4	Present values: multiple payments	418
A.4.1	Irregular payments	418
A.4.2	Regular payments: annual payments with annual discounting	419
A.4.3	Perpetuities	419
A.5	Rates of return	420
A.5.1	Single-period rate of return	420
A.5.2	Internal rate of return or money-weighted rate of return	421
A.5.3	Time-weighted rate of return or geometric mean rate of return	423
Appendix B: Yields and Yields Curves		425
B.1	Yields	425
B.1.1	Current yield	425
B.1.2	Yield to maturity	425
B.2	Yield curves	427
B.2.1	The yield to maturity yield curve	427

B.2.2	The coupon yield curve	428
B.2.3	The par (or swap) yield curve	429
B.2.4	The spot (or zero-coupon) yield curve	430
B.2.5	The forward yield curve	433
B.2.6	The annuity yield curve	436
B.2.7	Rolling yield curve	437
Appendix C: Duration and Convexity		439
C.1	Duration	439
C.2	Convexity	446
Index		451