

TABLE OF CONTENTS

Introduction and Overview.....	1
Part I: DEMOGRAPHY, PENSION SCHEMES AND THE TREND TOWARDS COLLECTIVE SAVINGS IN SWITZERLAND.....	17
1 DEMOGRAPHIC TRENDS IN SWITZERLAND.....	19
1.1 Introduction.....	22
1.2 The Changing Age Structure of Swiss Residents.....	26
1.2.1 The Declining Birth Rate.....	26
1.2.2 The Declining Mortality Rate.....	29
1.2.3 Consequences for the Balance of the Population.....	33
1.3 Migration Gains and Foreign Workers in the Swiss Labour Force.....	36
1.3.1 Swiss Foreign Labour Policy.....	36
1.3.2 The Impact of Migration Gains on the Size of the Potential Labour Force.....	37
1.3.3 The Development of the Non-permanent Foreign Labor Force.....	39
1.4 The Development of the Active Population.....	41
1.5 Scenario Analysis of the Demographic Development of the Swiss Population to the Year 2025.....	45
1.5.1 The 1984 Scenarios.....	46
1.5.2 The 1986 Scenarios.....	48
1.5.3 The Scenarios in Summary.....	49
2 THE SWISS PENSION SCHEMES - LEGAL FOUNDATIONS, BENEFIT DESIGN, AND FINANCING.....	53
2.1 The Concept of Social Security in Switzerland - An Introduction.....	56
2.2 The Swiss State-Run Pension Scheme for the Elderly, Dependant and Disabled (AHV/IV).....	60
2.2.1 Social Security Benefits of the AHV/IV.....	61
2.2.2 Calculation of benefits.....	64
2.2.2.1 The Pension Formula.....	64
2.2.3 Contributions to the State-Run Pension Scheme.....	70
2.2.4 The Organization of the State-Run Pension Scheme (AHV/IV).....	72

2.3	The Swiss Occupational Pension Schemes Legal Foundations, Benefit Design and Financing.....	75
2.3.1	The Swiss Federal Law on Occupational Retirement, Survivors' and Disability Pension Schemes.....	75
2.3.2	Insurance Coverage and Benefits of the Occupational Pension Schemes.....	79
2.3.2.1	Insured Salaries	81
2.3.2.2	Insurance Conditions and Types of Benefit.....	82
2.3.2.3	Vesting of Benefits.....	86
2.3.2.4	Lump Sum Payment versus Annuity	88
2.3.3	Contributions to the Occupational Pension Schemes	89
2.3.3.1	Actuarial Cost Methods.....	90
2.3.3.2	Minimum Cost of a BVG Pension Scheme	92
2.3.4	Recognized Forms of Pension Insurance	93
2.4	Appendix: Organization and Supervision of the Occupational Pension Schemes.....	100
2.4.1	Legal Form of Incorporation of a Pension Scheme.....	100
2.4.2	Adapting Existing Pension Schemes to the BVG Regulations.....	102
2.4.2.1	Envelope Fund	102
2.4.2.2	Split Between the BVG Pension Scheme and a Supplementary Pension Scheme.....	103
2.4.3	Registration of Pension Schemes	104
2.4.4	Control Procedures and Supervision of The Occupational Pension Schemes.....	105
2.4.4.1	The Auditors.....	105
2.4.4.2	Experts on Occupational Pension Schemes.....	106
2.4.4.3	Supervision of Pension Schemes	107
2.4.4.4	Safety Fund and Substitution Scheme.....	109
3	THE MARKET FOR PENSION FUND MANAGEMENT: GROWTH OF ASSETS AND INSTITUTIONAL PARTICIPATION.....	111
3.1	The Secular Trend Towards Collective Savings.....	114
3.2	Trends in Total Assets of Life Insurance and Pension Funds	117
3.2.1	The Use of Scenario Analysis for Flow-of-Funds' Projections.....	117
3.2.2	Description of the Scenarios	121
3.2.3	Development of The Surplus/Deficit of the Swiss State-Run Pension Scheme (AHV)	123
3.2.4	Development of the Total Assets of the Swiss Occupational Pension Schemes.....	127
3.2.5	Comparison of the Results of the Scenarios	131

3.3	The Beneficiaries of the Trend Towards Collective Savings in Switzerland	133
3.3.1	The Pension Funds	133
3.3.1.1	Institutional Background	134
3.3.1.2	Assets Under Management.....	135
3.3.1.3	Impact of the Introduction of the BVG-Law.....	136
3.3.2	The Life Assurance Industry.....	137
3.3.2.1	Institutional Background.....	137
3.3.2.2	Assets Under Management.....	138
3.3.2.3	Impact of the Introduction of the BVG-Law.....	141
3.3.3	Collective and Pooled Foundations	143
3.3.3.1	Institutional Background.....	143
3.3.3.2	Assets Under Management.....	144
3.3.3.3	Impact of the Introduction of the BVG-Law	145
3.3.4	Investment Foundations.....	146
3.3.4.1	Institutional Background.....	146
3.3.4.2	Assets Under Management.....	148
3.3.4.3	Impact of the Introduction of the BVG-Law.....	149
3.3.4.4	Major Advantages and Disadvantages for Institutional Investors	149
3.3.5	Mutual Funds.....	150
3.3.5.1	Institutional Background.....	150
3.3.5.2	Assets Under Management.....	151
3.3.5.3	Impact of the Introduction of the BVG-Law.....	151
3.3.5.4	Major Advantages and Disadvantages for Institutional Investors	152
3.4	The Management of the Assets of the Occupational Pension Schemes	153
3.4.1	The Structure of the Swiss Market for Pension Fund Management.....	153
3.5	Appendix: Description of the Models used for the Asset Projection of the Occupational Pension Schemes and the AHV	159
3.5.1	The Structure of the AHV-Model	159
3.5.2	The Structure of the BVG-Model	165
3.5.3	Earlier Studies of the Development of Total Assets of the Occupational Pension Schemes in Switzerland.....	169

**PART II:
MANAGING PENSION OBLIGATIONS..... 173**

4	ACTUARIAL AND LEGAL PROVISIONS WHICH DETERMINE PORTFOLIO BEHAVIOUR.....	175
4.1	Pension Accounting - A Comparison of Swiss and U.S. Regulations	178
4.2	The Determination of Pension Liabilities.....	183
4.2.1	Actuarial Assumptions.....	183
4.2.2	The Calculation of the Components of Pension Liability.....	187
4.2.2.1	An Illustrative Pension Plan: Plan Provisions, Actuarial Assumptions and Employee Demographics.....	187
4.2.2.2	The Funding Calculation	189
4.2.2.3	Calculating Interest Rate and Inflation Sensitivity of Pension Liabilities.....	197

4.3	Asset Valuation and Investment Restrictions	203
4.3.1	Actuarial Valuation of Pension Fund Assets.....	203
4.3.2	Investment Restrictions for Swiss Pension Funds and Life Assurance Companies.....	208
4.4	Determination of the Surplus or Deficit of an Occupational Pension Scheme	216
4.4.1	Balance Sheet Liability	218
4.4.2	Recovery of Surplus from a Terminating Plan	219
4.4.3	Amortization of Unfunded Liabilities.....	221
4.5	Fiscal and Tax Treatment of Pension Schemes.....	223
4.6	Investment Objectives of Pension Funds and Life Assurance Companies.....	224
5	INVESTMENT BEHAVIOUR OF PENSION FUNDS AND THE LIFE ASSURANCE INDUSTRY.....	227
5.1	International Comparison of Investment Behaviour of Pension Funds and Life Assurance Companies.....	230
5.1.1	The Investment Behaviour of Pension Funds 1970-1985.....	230
5.1.2	The Investment Behaviour of Life Assurance Companies 1970-1985	233
5.1.3	The Portfolio Composition of Institutional Investors in Switzerland	238
5.1.3.1	The Portfolio Composition of Public and Private Sector Pension Funds.....	238
5.1.3.2	The Portfolio Composition of Life Assurance Companies.....	239
5.1.3.3	The Fixed-Income Portfolio of the Central Compensation Fund.....	240
5.2	The Past Performance of Pension Fund Investments - Fulfilling the Actuarial Promise ?	242
5.2.1	Measuring the Performance of Swiss Pension Funds	242
5.2.2	The Performance of Pension Fund Investments after World War II.....	243
5.2.3	Problems with the Traditional Investment Behaviour.....	247
5.2.4	Reasons for a Changing Investment Behaviour	250
5.3	The Changing Investment Behaviour of Swiss Pension Funds and Life Assurance Companies.....	253
5.3.1	Description and Coverage of the Survey on Institutional Investment Behaviour	253
5.3.2	Investment Behaviour of Big Pension Schemes and Life Assurance Companies - Survey Results.....	254
5.3.2.1	Equity Share	254
5.3.2.2	Domestic Bond Share.....	256
5.3.2.3	SFr Foreign Bond Share.....	257
5.3.2.4	Foreign Currency Bond Share.....	259
5.3.2.5	Mortgage Bond and Mortgage Share	260
5.3.2.6	Convertible Bond Share.....	260
5.3.2.7	Property Shares	260

5.4	The Restructuring of Institutional Portfolios and the Growth of Pension Funds: Implications for the Swiss Capital Markets	262
5.4.1	The Development of Relative Demand and Supply for Domestic Financial Assets	262
5.4.2	Trading Practices and the Growing Institutional Transaction Volume.....	268
5.4.3	The Growing Institutional Demand for Domestic Financial Assets: Implications for the International Investor	270
5.4.4	Business Opportunities in the Swiss Market for Pension Fund Management	270
5.5	Appendix: Survey of Recent Institutional Portfolio Behaviour and Medium-Term Investment Intentions	272
5.5.1	Coverage of the Survey	
5.5.2	The Distribution of Portfolio Weights - Survey Results.....	275

**PART III:
THE USE OF MODERN PORTFOLIO THEORY FOR PENSION
FUND MANAGEMENT.....281**

6	International Asset Allocation for Pension Schemes: The Cutting Edge.....	283
6.1	Globalization of Institutional Investment Behaviour: An International Phenomenon	287
6.2	Risk and Return of International Investments - Why Swiss Investors Should Have Diversified	295
6.2.1	The Data	295
6.2.2	Analysis of Risk and Return of Different Asset Categories in 8 Countries.....	296
6.2.3	The Correlation Structure of Asset Returns.....	302
6.3	Optimal Asset Allocation	305
6.3.1	Currency Benchmark Dependency of Mean-Variance Efficient Portfolios.....	306
6.3.2	The Stability of Portfolio Weights Obtained from Past Sample Estimates	308
6.3.3	The Stability of the Estimated Risk-Structure of Asset Returns	312
6.4	Hedging of Foreign Exchange Risk and the Risk Structure of International Asset Returns	318
6.5	The Role of Portfolio Optimization in Investment Planning	322
6.6	Appendix: Risk, Return and Correlation Coefficients of International Investments	324

7	Portfolio Optimization as a Tool for Strategic Investment Decision-Making	329
7.1	Portfolio Optimization Under Shortfall Constraints.....	332
7.1.1	The Determination of Risk Boundaries Through Confidence Limits	332
7.1.2	The Distribution of Returns on International Investment.....	336
7.2	A Structure Approach to Asset Allocation and Investment Policy Formulation.....	341
7.2.1	STEP 1: The Domestic Asset Mix.....	342
7.2.2	STEP 2: The International Asset Mix	345
7.2.3	STEP 3: The Size of the International Allocation.....	347
7.2.4	Simulations of Model Portfolios	350
7.3	International Diversification Strategies	355
7.3.1	The Passive Approach.....	355
7.3.2	The Active Approach (Tactical Asset Allocation).....	359
7.3.3	Performance Measurement.....	365
7.4	Conclusions.....	367
7.5	Appendix: Portfolio Insurance Strategies.....	368
	Glossary	371
	References	373
	Index	403

LIST OF FIGURES

Figure 1.1	The Process of Demographic Transformation - The Industrial Countries.....	22
Figure 1.2	Demographic Factors affecting the Flow of Funds of Pension Systems.....	25
Figure 1.3	Age Distribution of Registered HIV Positive Cases (July 1985 until December 1986).....	32
Figure 1.4	The Historical Development of the Total Fertility Index for the Swiss Population since 1946.....	35
Figure 1.5	Foreign Workers by Status 1960-1984	40
Figure 1.6	Age Pyramids of the Permanent Resident Population According to the Main Scenario of 1986 (1986-A)	51
Figure 1.7	Age Pyramids of the Permanent Resident Population According to the Upper and Lower Scenarios of 1986 (1986-B, 1986-C) in 2025	52
Figure 2.1	The Three Pillar Concept of Social Security in Switzerland	56
Figure 2.2	The Declining Importance of the AHV	69
Figure 2.3	The Organizational Structure of the Swiss State-Run Pension Scheme.....	74
Figure 2.4	Insurance of the Final Salary through AHV & the Occupational Pension Schemes	76
Figure 2.5	Co-ordinated Earned Income and Gross Salary.....	81
Figure 2.6	Comparison of Actuarial Cost Methods.....	91
Figure 2.7	Organizational Structure of the Ciba Geigy Pension Fund.....	95
Figure 2.8	The Organization of a Pooled Foundation	99
Figure 3.1	The Net Increase of Assets of Individual and Collective Forms of Savings in 1988 (in %)......	116
Figure 3.2	The Emerging Deficit of the AHV 1970-2025	124
Figure 3.3	The Accumulation of the Occupational Pension Schemes' Assets 1970-2025	127
Figure 3.4	Cover Stock Assets of the Swiss Life Assurance Industry 1980-1987	142
Figure 3.5	Estimated Market Share of Big Pension Schemes, Life Assurance Companies, Collective and Pooled Foundations and the AHV in Total Pension Fund Assets 1985 and 1995.....	156
Figure 3.6	Interdependence of Pension Schemes, Life Assurance Companies and other Financial Intermediaries	157
Figure 3.7	Schematic Structure of the AHV- and the BVG-Model	160
Figure 3.8.A	The Structure of the AHV-Model (Benefit Model).....	163
Figure 3.8.B	The Structure of the AHV-Model (Income Model and AHV-Surplus Model).....	164

Figure 4.1	Current Salary Scale of an Illustrative Swiss Pension Scheme.....	189
Figure 4.2	Age Distribution of Active and Retired Participants	190
Figure 4.3	Pension Liabilities	192
Figure 4.4	Effective Duration of the PBOa	202
Figure 4.5	Hierarchy of Investment Objectives	225
Figure 5.1.A	Portfolio Behaviour of Pension Funds: Bonds.....	230
Figure 5.1.B	Portfolio Behaviour of Pension Funds: Equity.....	231
Figure 5.1.C	Portfolio Behaviour of Pension Funds: Property	232
Figure 5.2.A	Portfolio Behaviour of Life Assurance Companies: Bonds.....	234
Figure 5.2.B	Portfolio Behaviour of Life Assurance Companies: Equity.....	235
Figure 5.2.C	Portfolio Behaviour of Life Assurance Companies: Property	236
Figure 5.3	Asset Structure of Private and Public Sector Pension Schemes in 1984	239
Figure 5.4	Asset Structure of Swiss Life Assurance Cover Stock Funds 1984 and 1987	240
Figure 5.5	Portfolio Composition of the AHV/IV	241
Figure 5.6	Spread Between Nominal Return on Pension Schemes' Assets and the 4% Return Target.....	249
Figure 5.7	Cumulative Real Wage Growth Versus Cumulative Real Return on Pension Fund Investments 1945-87 (1945 = 100).....	250
Figure 5.8	Coverage of the Survey of Big Pension Funds'a and Life Assurance Companies' Investment Behaviour	274
Figure 5.9	Indicated Equity Share of All Participants in the Survey on Institutional Investment Behaviour	275
Figure 5.10	Indicated Domestic Bond Share of All Participants in the Survey on Institutional Investment Behaviour	276
Figure 5.11	Indicated SFr Foreign Bond Share of All Participants in the Survey on Institutional Investment Behaviour	277
Figure 5.12	Indicated Foreign Bond Share of All Participants in the Survey on Institutional Investment Behaviour	278
Figure 5.13	Indicated Property Share of All Participants in the Survey on Institutional Investment Behaviour	279
Figure 6.1	Ranking of Bond and Equity Markets According to Transaction Cost and Liquidity	291
Figure 6.2	Risk/Return Relationship of Different Domestic vs. International Equity Allocations 12/1977-12/1987	293
Figure 6.3	Risk/Return Relationship of Different Domestic vs. International Bond Allocations 12/1977-2/1987	293
Figure 6.4	Absolute Change in Correlation Coefficients Between 1977-82 and 1983-1987	314
Figure 6.5	Excess Performance of an International Bond and Equity Portfolio Fully Hedged into SFr over the Unhedged Portfolio	322
Figure 6.6	Distribution of Monthly Total Rates of Return of a Salomon Brothers World Bond Index Fund in SFr-Terms 1978-1987	327
Figure 6.7	Distribution of Monthly Total Rates of Return of a Morgan Stanley Capital International World Equity Index Funds in SFr- Terms 1978-1987.....	328

Figure 7.1	Annual Realized Returns and 90% Confidence Interval for SFr Government Bonds from 1978-1987.....	333
Figure 7.2	Annual Realized Returns and 90% Confidence Interval for Swiss Equities from 1978-1987	333
Figure 7.3	Shortfall Constraints in a Risk/Return Diagram.....	335
Figure 7.4	Mean-Variance Efficient Domestic Portfolios for a Swiss Pension Scheme.....	343
Figure 7.5	Mean-Variance Efficient International Bond/Equity Mixes for a Swiss Pension Scheme.....	346
Figure 7.6	Mean-Variance Efficient International Allocations for a Swiss Pension Scheme	348
Figure 7.7	Risk/ Return Relationships for 16 Model Portfolios	352
Figure 7.8	Tactical Asset Allocation - Expected Returns Spread Input.....	364

LIST OF TABLES

Table 1.1	General Fertility Rates and Total Fertility Index of the Swiss Population 1965-1985	26
Table 1.2	The Life Expectancy of the Swiss Population (Years)	29
Table 1.3	The Age Structure of the Swiss Resident Population (P) and Swiss Citizens (C) - An Increasing Load Ratio.....	33
Table 1.4	The System of Work- and Residence Permits in Switzerland	37
Table 1.5	The Development of the Foreign Labour Force in Switzerland 1960-1985 (end of August figures)	38
Table 1.6	Participation Rate in Percent of the Active Population in 1980.....	44
Table 1.7	The Projections of the Swiss Federal Statistical Office	50
Table 2.1	Annual AHV-Pensions since 1948	64
Table 2.2	Contributions to the AHV/IV as of the End of 1988	71
Table 2.3	Minimum Benefits according to BVG (End 1987)	85
Table 2.4	Minimum Contribution Rates for a BVG Occupational Pension Scheme	92
Table 2.5	Overview of the Legal Basis for Various Forms of Incorporation of Pension Funds.....	101
Table 3.1	Trends in the Total Assets of Life Assurance and Pension Funds 1975 and 1985.....	115
Table 3.2	Cash Flows and Increase of Total Assets of the Occupational Pension Schemes 1984-2025 - Main Scenario	129
Table 3.3	Comparison of the Assets of the AHV and the Occupational Pension Schemes under Various Scenarios	131
Table 3.4	Trends in the Growth of Life Assurance Premiums, Total Pension Contributions and Cover Stock Assets 1980-1987	139
Table 3.5	Investment Foundations in Switzerland (Assets in Swiss Francs	148
Table 3.6	Increase of Total Assets of Occupational Pension Schemes 1984-2010	171
Table 4.1	Pension Plan Provisions, Assumptions and Employee Demographics - A Summary	188
Table 4.2	Prescribed Investment Limits (Article 53-55 BVV2).....	213
Table 4.3	Insurance-Technical Balance Sheet for an Autonomous Pension Fund (balancing based on the principle of a closed group).....	217
Table 5.1	Annual Returns of Swiss Pension Funds' Domestic Investments 1946-1987.....	245
Table 5.2	Equity Share in Total Assets of the Surveyed Pension Schemes and Life Assurance Companies	255
Table 5.3	Domestic Bond Share in Total Assets of the Surveyed Pension Schemes and Life Assurance Companies.....	257
Table 5.4	SFr Foreign Bond Share in Total Assets of the Surveyed Pension Schemes and Life Assurance Companies	258

Table 5.5	Foreign Bond Share in Total Assets of the Surveyed Pension Schemes and Life Assurance Companies	259
Table 5.6	Property Share in Total Assets of the Surveyed Pension Schemes and Life Assurance Companies.....	261
Table 5.7	Approximate Net New Investments in Different Swiss Domestic Asset Categories by Big Pension Schemes and the Swiss Life Assurance Industry 1986-1992	265
Table 6.1	Risk and Return of Various Asset Classes in 8 Countries	300
Table 6.2	Correlation Coefficients of the Total Rates of Return for Various Asset Categories Across Currencies	303
Table 6.3	Portfolio Weights of Mean-Variance Efficient Portfolios	309
Table 6.4	Regression Analysis.....	314
Table 6.5	Test of Stability of Correlation Coefficients.....	316
Table 6.6	Currency α and β for different Country Indices	320
Table 6.7	Risk, Return and Weight in a Mean-Variance Efficient Portfolio of International Assets Fully Hedged into Swiss Franc	321
Table 6.8	Correlation Coefficients of the Total Return for Various Asset Categories Across Currencies	325
Table 7.1	The Distribution of International Bond and Equity Returns	337
Table 7.2	Investment Prospects in Terms of Strategic Risk Limits	344
Table 7.3	Investment Prospects in Terms of Strategic Risk Limits for a Global Portfolio	349
Table 7.4	Weights of Assets and Historical Performance (1977-1985 for the 16 Model Portfolios).....	350
Table 7.5	Realized Annual Returns of the Model Portfolios 1986-1987.....	353
Table 7.6	Purchasing Cost of the Entire Index (\$ 100 Million Portfolio).....	358