

# Contents

<i>List of figures</i>	page x
<i>List of tables</i>	xii
<i>List of boxes</i>	xv
<i>Foreword</i>	xvii
José-Manuel González-Páramo	
<i>Introduction</i>	xx
Ulrich Bindseil, Fernando González and Evangelos Tabakis	

## Part I Investment operations **1**

1	Central banks and other public institutions as financial investors	3
	Ulrich Bindseil	
	1 Introduction	3
	2 Public institutions' specificities as investors	4
	3 How policy tasks have made central banks large-scale investors	10
	4 Optimal degree of diversification of public institutions' financial assets	17
	5 How actively should public institutions manage their financial assets?	23
	6 Policy-related risk factors	29
	7 The role of central bank capital – a simple model	34
	8 Integrated risk management for public investors	41
	9 Conclusions	48
2	Strategic asset allocation for fixed-income investors	49
	Matti Koivu, Fernando Monar Lora, and Ken Nyholm	
	1 Introduction	49
	2 A primer on strategic asset allocation	50
	3 Components of the ECB investment process	68

4	Forward-looking modelling of the stochastic factors	75
5	Optimization models for SAA under a shortfall approach	89
6	The ECB case: an application	99
3	Credit risk modelling for public institutions' investment portfolios	117
	Han van der Hoorn	
1	Introduction	117
2	Credit risk in central bank and other public investors' portfolios	118
3	The ECB's approach towards credit risk modelling: issues and parameter choices	122
4	Simulation results	143
5	Conclusions	155
4	Risk control, compliance monitoring and reporting	157
	Andres Manzanares and Henrik Schwartzlose	
1	Introduction	157
2	Overview of the distribution of portfolio management tasks within the Eurosystem	159
3	Limits	161
4	Portfolio management oversight tasks	179
5	Reporting on risk and performance	189
6	IT and risk management	196
5	Performance measurement	207
	Hervé Bourquin and Roman Marton	
1	Introduction	207
2	Rules for return calculation	208
3	Two-dimensional analysis: risk-adjusted performance measures	213
4	Performance measurement at the ECB	219
6	Performance attribution	222
	Roman Marton and Hervé Bourquin	
1	Introduction	222
2	Multi-factor return decomposition models	224
3	Fixed-income portfolios: risk factor derivation	228
4	Performance attribution models	241
5	The ECB approach to performance attribution	257
6	Conclusions	267

<b>Part II: Policy operations</b>		<b>269</b>
<b>7</b>	Risk management and market impact of central bank credit operations Ulrich Bindseil and Francesco Papadia	271
	1 Introduction	271
	2 The collateral framework and efficient risk mitigation	274
	3 A cost–benefit analysis of a central bank collateral framework	284
	4 Conclusions	300
<b>8</b>	Risk mitigation measures and credit risk assessment in central bank policy operations Fernando González and Phillipe Molitor	303
	1 Introduction	303
	2 Assessment of collateral credit quality	307
	3 Collateral valuation: marking to market	315
	4 Haircut determination methods	318
	5 Limits as a risk mitigation tool	337
	6 Conclusions	338
<b>9</b>	Collateral and risk mitigation frameworks of central bank policy operations – a comparison across central banks Evangelos Tabakis and Benedict Weller	340
	1 Introduction	340
	2 General comparison of the three collateral frameworks	342
	3 Eligibility criteria	348
	4 Credit risk assessment and risk control framework	353
	5 Conclusions	357
<b>10</b>	Risk measurement for a repo portfolio – an application to the Eurosystem’s collateralized lending operations Elke Heinle and Matti Koivu	359
	1 Introduction	359
	2 Simulating credit risk	360
	3 Simulating liquidity-related risks	366
	4 Issues related to concentration risks	368
	5 Risk measures: Credit Value-at-Risk and Expected Shortfall	376
	6 An efficient Monte Carlo approach for credit risk estimation	379

	7	Residual risk estimation for the Eurosystem's credit operations	387
	8	Conclusions	393
11		Central bank financial crisis management from a risk management perspective	394
		Ulrich Bindseil	
	1	Introduction	394
	2	Typology of financial crisis management measures	396
	3	Review of some key results of the literature	399
	4	Financial stability role of central bank operational framework	416
	5	The inertia principle of central bank risk management in crisis situations	418
	6	Equal access FCM measures	422
	7	FCM measures addressed to individual banks (ELA)	434
	8	Conclusions	437
<b>Part III: Organizational issues and operational risk</b>			<b>441</b>
12		Organizational issues in the risk management function of central banks	443
		Evangelos Tabakis	
	1	Introduction	443
	2	Relevance of the risk management function in a central bank	444
	3	Risk management best practices for financial institutions	445
	4	Six principles in the organization of risk management in central banks	448
	5	Conclusions	459
13		Operational risk management in central banks	460
		Jean-Charles Sevet	
	1	Introduction	460
	2	Central bank specific ORM challenges	463
	3	Definition of operational risk	465
	4	ORM as overarching framework	468
	5	Taxonomy of operational risk	469
	6	The ORM lifecycle	471
	7	Operational risk tolerance policy	472
	8	Top-down self-assessments	476

3.6	9	Bottom-up self-assessments	479
3.7	10	ORM governance	483
7.1	11	KRIs and ORM reporting	484
	12	Conclusions	488
7.2		One-week moving average spread between non-EEA and EEA issuers	
		<i>References</i>	490
		<i>Index</i>	507
7.3		Spread between the three-month EURIBOR and three-month EUREPO rates since the introduction of the EUREPO in March 2002 – until end 2007	294
5.2		Evolution of MRO weightings	21
5.3		1 Week unsecured interbank rates in 2002	22
5.4		Evolution of LTRM	23
5.5		Efficient frontier in E[ $r$ ]-Var space	24
5.6		Risks involved in central bank repo	25
5.7		Components of an investment process	26
5.8		Basic determinants of the investment process	27
5.9		Holding period	28
5.10		Relationship between position size and risk	29
5.11		Yield curve	30
5.12		Normal macroeconomic evolution: (a) GDP, (b) CPI, (c) Yield curve	31
5.13		Value-at-Risk to credit risk for a single issuer	32
5.14		Projected average evolution of the US Government bill collateral framework in a normal example	33
5.15		Projected distribution of returns in a normal example	34
5.16		(a) US Gov 0-1Y; (b) US Gov 7-10Y	35
5.17		Distribution of returns in a normal example: (a) US Gov 0-1Y; (b) US Gov 7-10Y	36
5.18		(a) US Gov 0-1Y; (b) US Gov 7-10Y	37
5.19		Inflationary macroeconomic evolution: (a) GDP, (b) CPI, (c) Yield curve	38
5.20		Growth: (a) GDP, (b) CPI, (c) Yield curve	39
5.21		Projected average evolution of the US Government bill collateral framework in a non-normal example	40
5.22		Curve in a non-normal example	41
5.23		Projected distribution of returns in a non-normal example	42
5.24		(a) US Gov 0-1Y; (b) US Gov 7-10Y	43
5.25		Distribution of returns in a non-normal example	44
5.26		(a) US Gov 0-1Y; (b) US Gov 7-10Y	45
5.27		The effect on expected shortfalls of changes in asset correlations	46
5.28		Asset value and migration (probability not according to state)	47
5.29		Impact of asset correlation on portfolio risk (the potential)	48
5.30		Liquidity risk	49
5.31		Comparison of portfolios by rating and by industry	50
5.32		Drivers of portfolio risk	51
5.33		Operational risk	52