Detlef Seese Christof Weinhardt Frank Schlottmann (Editors)

# Handbook on Information Technology in Finance



### TABLE OF CONTENTS

Preface	V
Contributors	XXV

.

,

## Part I. IT Systems, Infrastructure and Applications $\ ^{\circ}$ in Finance

Introduction	to Part I	3
CHAPTER	1	
SOA in the	Financial Industry – Technology Impact in Companies' Practice	9
Heiko Paoli	, Carsten Holtmann, Stephan Stathel, Olaf Zeitnitz, Marcel Jako	obi
1.1	Introduction	9
1.2	SOA – Different Perspectives	11
1.3	SOA – Technical Details	12
	1.3.1 Elements and Layers	12
	1.3.2 Comparison with State-of-the-art Distributed	
-	Architecture Alternatives	15
1.4	Value Proposition of SOA	17
1.5	Case Study Union Investment	18
	1.5.1 Introduction to the Use Case Company	18
	1.5.2 SOA Implementation at the Use Case Company	20
1.6	Discussion	23
1.7	Conclusion	25
CHAPTER	2	
Information	Systems and IT Architectures for Securities Trading	29
Feras Dabo	us, Fethi Rabhi	
2.1	Introduction	29

2.2	Financ	ial Markets: Introduction and Terminology	30
	2.2.1	Introduction to Financial Markets	30
	2.2.2	Capital Markets Trading Instruments	31
	2.2.3	Equity Market	31
	2.2.4	Derivatives Market	32
	2.2.5	Types of Orders	32
	2.2.6	Classifications of Marketplaces	33
2.3	Inform	ation Systems for Securities Trading	34
	2.3.1	Securities Trading Information Flow	34
	2.3.2	Categories of Capital Markets' Information Systems	37
2.4	Case S	tudies	39
	2.4.1	SMARTS	39
	2.4.2	X-STREAM	42
2.5	IT Inte	gration Architectures and Technologies	44
	2.5.1	Transport Level	45
	2.5.2	Contents (Data) Level	46
	2.5.3	Business Process Level	47
2.6	Conclu	ision	49

Product Mar	nagement Systems in Financial Services Software Architectures	51
Christian Ki	nogler, Michael Linsmaier	
3.1	The Initial Situation	51
3.2	Weaknesses in Software Architectures	
	and Business Processes	52
3.3	Objectives and Today's Options	55
3.4	A 'Product Server Based Business Application Architecture'	56
	3.4.1 Business Considerations	56
	3.4.2 Technical Considerations	58
3.5	Migrating into a New Architecture	60
	3.5.1 Blueprint	62
	3.5.2 Product Data Analysis	62
	3.5.3 Repository	62
	3.5.4 Consolidated Architecture	64
	3.5.5 Innovated Architecture	65
3.6	Impacts on Software Development	67
3.7	Conclusion	69

Management	of Security Risks – A Controlling Model	
for Banking	Companies	73
Ulrich Faiss	t, Oliver Prokein	
4.1	Introduction	73

The Ri	sk Management Cycle	74
4.2.1	Identification Phase	74
4.2.2	Quantification Phase	77
4.2.3	Controlling Phase	79
4.2.4	Monitoring Phase	80
A Con	trolling Model for Security Risks	82
4.3.1	Assumptions	82
4.3.2	Determining the Optimal Security and Insurance Level.	85
4.3.3	Constraints and Their Impacts	87
Conclu	usion	91
	The Ri 4.2.1 4.2.2 4.2.3 4.2.4 A Con 4.3.1 4.3.2 4.3.3 Conclu	The Risk Management Cycle4.2.1Identification Phase4.2.2Quantification Phase4.2.3Controlling Phase4.2.4Monitoring PhaseA Controlling Model for Security Risks4.3.1Assumptions4.3.2Determining the Optimal Security and Insurance Level4.3.3Constraints and Their ImpactsConclusion

Process-Orie	nted Systems i	in Corporate Treasuries:			
A Case_Stud	A Case Study from BMW Group				
Christian Ul	rich, Jan Hen	kel			
5.1	Introduction.				
5.2	The Technolo	gical Environment			
5.3	Challenges fo	r Corporate Treasuries	101		
5.4	Portrait BMW	/ Group	104		
5.5	Portrait BMW	/ Group Treasury			
	5.5.1 Orga	anization and Responsibilities	106		
	5.5.2 Busi	ness Process Design			
5.6	<b>Business</b> Proc	cess Support			
	5.6.1 Best	-of-Breed System Functionalities .	111		
	5.6.2 Deci	sion-Support Functionalities			
5.7	Final Remark	s			

Streamlining	g Foreigr	n Exchange Management Operations	
with Corpor	ate Finar	ncial Portals	123
Hong Tuan .	Kiet Vo,	Martin Glaum, Remigiusz Wojciechowski	
6.1	Introdu	ction	123
6.2	Challer	nges of Multinational Financial Management	124
6.3	Corpor	ate Financial Portals	125
	6.3.1	Key Characteristics of Corporate Portals	126
	6.3.2	Corporate Financial Portals	127
6.4	Bayer's	s Corporate Foreign Exchange Management with	
	the Cor	porate Financial Portal	128
	6.4.1	Corporate Foreign Exchange Management	129
	6.4.2	Bayer's Foreign Exchange Management Practice	130
	6.4.3	Redesigning Foreign Exchange Risk Management	
		with CoFiPot	131
	6.4.4	Lessons Learned	135
6.5	Conclu	sion	138

Canital Marl	vets in the Gulf. International Access	
Electronic T	reding and Degulation	1/1
Pater Gomb	ar Marco Lutat Stoffan Schubart	141
7 1	Introduction	1/1
7.1	The Evolution of GCC Stock Markets and Its Implications	141
7.2	The Evolution of OCC Slock Markets and its implications	143
7.5	Requirements of International Investors	148
/.4	Systematic Analysis of the Exchanges in the Region	151
	7.4.1 Banrain Stock Exchange (BSE)	151
	7.4.2 Iadawul Saudi Stock Market (ISSM)	154
	7.4.3 Kuwait Stock Exchange (KSE)	100
	7.4.4 Muscat Securities Market (MSM)	156
	7.4.5 Doha Securities Market (DSM)	157
-	7.4.6 Dubai Financial Market (DFM)	158
	7.4.7 Abu Dhabi Securities Market (ADSM)	159
7.5	Approaches to Further Open up the Stock Markets to	
	the International Community – The Dubai International	
	Financial Exchange (DIFX) Case	160
7.6	Conclusion	165
7.7	Appendix	165
<b>O</b>		
CHAPTER &		
Competition	of Retail Trading Venues – Online-brokerage	
and Security	Markets in Germany	171
Dennis Kund	lisch, Carsten Holtmann	
8.1	Introduction	171
8.2	Service Components and Fees in Securities Trading	173
	8.2.1 Service Components in Securities Trading	173
	8.2.2 Access Fees for Participants at German Exchanges	174
	8.2.3 Fees for Price Determination Services	176
	8.2.4 Discussion of Services and Fees	179
8.3	Analysis of the Price Models of Online-brokers	181
	8.3.1 Forms of Appearance of Online-brokerage	181
	8.3.2 Price Models of Selected Online-brokers	182
	8.3.3 Comparison of the Price Models and Discussion	184
8.4	Outlook: Off-exchange-markets as Competitors	187
8.5	Conclusion	189
	· · · · · · · · · · · · · · · · · · ·	
CHAPTER 9	)	

Strategies for a Customer-Oriented Consulting Approach 19		
Alexander S	chöne	
9.1	Introduction	193
9.2	Qualitative Customer Service Through Application	
	of Portfolio Selection Theory	194

/

	9.2.1	Markowitz' Portfolio Selection Theory	195
	9.2.2	Application to Real-World Business	197
	9.2.3	Consideration of Existing Assets	199
	9.2.4	Illiquid Asset Classes and Transaction Costs	200
	9.2.5	Conclusions for Daily Use	201
9.3	Suppor	t of Customer-Oriented Consulting Using Modern	
	Consult	ting Software	202
	9.3.1	Architecture of a Customer-Oriented	
		Consulting Software	202
	9.3.2	Mobile Consulting as a Result	
		of Customer-Orientation	205
9.4	Conclu	sion	208
· -			
CHAPTER	10	· · · · · · · · · · · · · · · · · · ·	
A Reference	e Model f	for Personal Financial Planning	209
Oliver Bran	un, Günter	r Schmidt	
10.1	Introdu	ction	209
10.2	State of	f the Art	210
	10.2.1	Personal Financial Planning	210
	10.2.2	Systems and Models	212
	10.2.3	Reference Models	214
	10.2.4	Requirements for a Reference Model	
		for Personal Financial Planning	216
10.3	Framev	vork for a Reference Model for Personal	
	Financi	al Planning	218
10.4	Analysi	is Model	220
	10.4.1	Dynamic View on the System: Use Cases	220
	10.4.2	Structural View on the System: Class Diagrams	221
	10.4.3	Use Case Realization:	
		Sequence and Activity Diagrams	222
	10.4.4	Example Models	222
10.5	System	Architecture	230
10.6	Conclu	sion and Future Trends	233
CHAPTER	11	· ·	
Internet Pag	yments in	Germany	239
Malte Krue	eger, Kay	Leibold	
11.1	Introdu	ction: The Long Agony of Internet Payments	239
11.2	Is There	e a Market for Innovative Internet Payment Systems	? 240
	11.2.1	Use of Traditional Payment Systems:	
		Internet Payments and the Role of Payment Cultur	e 240
	11.2.2	The Role of Technology	242
	<b>11.2.3</b>	The Role of Different Business Models	244

.

11.3	Internet Payments in Germany: A View from Consumers
	and Merchants 247
	11.3.1 The Consumers' View
	11.3.2 The Merchants' View
11.4	SEPA
11.5	Outlook
CHAPTER 1	2
Grid Compu	ting for Commercial Enterprise Environments 257
Daniel Mino	li
12.1	Introduction
12.2	What is Grid Computing and What are the Key Issues? 259
12.3	Potential Applications and Financial Benefits
-	of Grid Computing
12.4	Grid Types, Topologies, Components, Layers -
	A Basic View
12.5	Comparison with other Approaches
12.6	A Quick View at Grid Computing Standards
12.7	A Pragmatic Course of Investigation on Grid Computing
CHAPTER 1	3
Operational	Metrics and Technical Platform for Measuring
Bank Proces	s Performance
Markus Kres	ss, Dirk Wölfing
13.1	Introduction
13.2	Industrialisation in the 21st Century?
13.3	Process Performance Metrics as an Integral Part of Business
	Performance Metrics
	13.3.1 Work Processes, Qualitative Criteria and Measuring
	Process Value
13.4	Controls for Strategic Alignment and Operational Customer
	and Resource Management
13.5	Metrics Used for Input/Output Analysis
13.6	Output Metrics: Cash Inflows a Function of Output Quality 297
13.7	Cash Outflows a Function of Available Capacity
13.8	Time and Volume as Non-financial Metrics
	of Process Performance
	13.8.1 Fundamental Input/Output Process
	Performance Characteristics
13.9	Technical Realization
	13.9.1 Monitoring Challenges
13.10	Related Work
13.11	SOA Based Business Process Performance Monitoring
	13.11.1 Data Warehouse
	13.11.2 Complex Event Processing

	13.11.3	Measuring "Time"	306
	13.11.4	Measuring "Volume"	307
	13.11.5	Measurement "Capacity"	307
	13.11.6	Measuring "Ouality"	308
	13.11.7	Measuring "Costs" or "Discounted Cash Flows"	
		(DCF)	308
13.12	Conclus	ion	308
CHAPTER 1	14		
Risk and IT	in Insura	1ces	311
Ute Werner			
14.1	The Lan	dscape of Risks in Insurance Companies	311
14.2	IT's Fun	ction for Risk Identification and Analysis	314
	14.2.1	Components of Underwriting Risk	314
	14.2.2	Assessing Hazard, Exposure, Vulnerability	
		and Potential Loss	316
	14.2.3	Information Management –	
	1 11212	Chances and Challenges	321
14 3	IT as a T	ool for Managing the Underwriting Risk	324
11.5	1431	Disaster Assistance	324
	1432	Claims Handling	326
	1433	Market Development	327
144	Conclus	ion	329
11.1	Concius	1011	
CHAPTER	15		
Resolving C	onceptual	Ambiguities in Technology	
Risk Manag	ement		333
Christian Ci	uske. Tilo	Dickopp. Axel Korthaus. Stefan Seedorf	
15.1	New Ch	allenges for IT Management	
15.2	Knowlee	dge Management Applications in Finance	334
	15.2.1	An Extended Perspective of Operational	
	10.2.1	Risk Management	334
	1522	Formal Ontologies as an Enabling Technology	336
	15.2.2	The Case for Ontology-based Technology	
	19.2.9	Risk Management	337
153	Technol	ngy Risk Management Using OntoRisk	338
10.5	1531	The Technology Risk Ontology	330
	1532	The OntoRisk Process Model	342
	1532	System Architecture	נ <del>ר</del> נ זאג
15 4	13.3.3 Case St	dy: Outsourcing in Banking	7+7 2/10
15.4		Mativation and Influencing Factors	040
	13.4.1	monvation and influencing raciols	348

15.4.2Trading Environment34915.4.3Analysis and Results35215.5Conclusion352

CHAPTER	16		
Extracting F	inancial	Data from SEC Filings	
for US GAA	P Accou	intants	357
Thomas Stü	mpert	· · · · · · · · · · · · · · · · · · ·	
16.1	Introdu	ction	357
16.2	Structur	re of 10-K and 10-Q Filings	359
	16.2.1	Structure of Document Elements	359
	16.2.2	Embedded Plain Text	360
	16.2.3	Embedded HTML	361
	16.2.4	Financial Reports Overview	362
16.3	Informa	ation Retrieval Within EASE	363
	16.3.1	Information Extraction from Traditional Filings	364
-	16.3.2	Standard Vector Space Model	365
	16.3.3	Extended Vector Space Model	367
	16.3.4	Extraction of HTML Documents	368
16.4	The Ro	le of XBRL	371
16.5	Empiric	cal Results	371
16.6	Conclus	sion	373
Part II. J	T METH	HODS IN FINANCE	
Introduction	n to Part I	I	379
CHAPTER	17		
<b>NT . 1 1</b>	<b>T</b> 1 1		

		<b>-</b> ·	
Netw	orks in	Finance	
4nna	Nagur	ney	
	17.1	Introdu	ction
	17.2	Financi	al Optimization Problems 385
	17.3	General	l Financial Equilibrium Problems
		17.3.1	A Multi-Sector, Multi-Instrument Financial
			Equilibrium Model
		17.3.2	Model with Utility Functions
		17.3.3	Computation of Financial Equilibria 395
	17.4	Dynam	ic Financial Networks with Intermediation
		17.4.1	The Demand Market Price Dynamics 400
		17.4.2	The Dynamics of the Prices at the Intermediaries 401
		17.4.3	Precursors to the Dynamics of the Financial Flows 401
		17.4.4	Optimizing Behavior of the Source Agents 402
		17.4.5	Optimizing Behavior of the Intermediaries 403
		17.4.6	The Dynamics of the Financial Flows Between
			the Source Agents and the Intermediaries 404
		17.4.7	The Dynamics of the Financial Flows Between
			the Intermediaries and the Demand Markets 405
		17.4.8	The Projected Dynamical System

	17.4.9	A Stationary/Equilibrium Point	406
	17.4.10	Variational Inequality Formulation of Financial	
		Equilibrium with Intermediation	407
	17.4.11	The Discrete-Time Algorithm (Adjustment Process)	408
	17.4.12	The Euler Method	408
	17.4.13	Numerical Examples	410
17.5	The Inte	gration of Social Networks with Financial Networks	412
CHAPTER	18		
Agent-based	l Simulati	on for Research in Economics	421
Clemens var	n Dinther		
18.1	Introduc	tion	421
18.2	Simulati	ion in Economics	423
	18.2.1	Benefits of Simulation	423
	18.2.2	Difficulties of Simulation	424
18.3	Agent-b	ased Simulation Approaches	427
	18.3.1	Pure Agent-based Simulation:	
		The Bottom-up Approach	427
	18.3.2	Monte Carlo Simulation	428
	18.3.3	Evolutionary Approach	430
	18.3.4	Reinforcement Learning	432
18.4	Summar	y	438
Силотер	10		
The Heteroo	i ) Ieneous A	gents Approach to Financial Markets	
Developmer	t and Mil	estones	113
	n anu ivin atzol		443
10 1	Introduc	tion	113
19.1	Fundam	ontal Assumptions in Financial Theory	445
19.2	1021	Pationality	444 114
	19.2.1	Efficient Market Uznothesis	4444 1/15
	19.2.2	Penresentative A gent Theory	445
10.3	Empirio	al Observations	445
19.5	Empire	ar Observations	440
17.4	10/1	Fundamentalists vs. Chartists	++ /
	19.4.1	Social Interaction	447
	19.4.2	A dantiva Baliefs	450
	19.4.5	Artificial Stock Markets	452 151
10.5	19.4.4 Composi	Artificial Stock Markets	454
19.5		Eriodman Hymothesis Povisited	430
	19.5.1	Dominant Stratagiog	450
10 <i>4</i>	19.3.2 Mult: A	Dominiani Suaregies	43 / 450
19.0	Iviulu-A	sou winkels	430
19./	Conclus	his and Applications	439
19.6	Conclus	IOII AIIU OULIOOK	439

An Adaptiv	e Model o	f Asset Price and Wealth Dynamics	
in a Market	with Hete	rogeneous Trading Strategies	465
Carl Chiare	ella, Xue-Z	Chong He	
20.1	Introduc	tion	465
20.2	Adaptiv	e Model with Heterogeneous Agents	468
	20.2.1	Notation	469
	20.2.2	Portfolio Optimization Problem	
		of Heterogeneous Agents	470
	20.2.3	Market Clearing Equilibrium Price –	
		A Growth Model	471
	20.2.4	Population Distribution Measure	471
	20.2.5	Heterogeneous Representative Agents	
		and Wealth Distribution Measure	472
	20.2.6	Performance Measure, Population Evolution	
		and Adaptiveness	472
	20.2.7	An Adaptive Model	474
	20.2.8	Trading Strategies	475
	20.2.9	Fundamental Traders	475
	20.2.10	Momentum Traders	475
	20.2.11	Contrarian Traders	476
20.3	An Adaj	ptive Model of Two Types of Agents	477
	20.3.1	The Model for Two Types of Agents	477
,	20.3.2	Wealth Distribution and Profitability	
		of Trading Strategies	478
	20.3.3	Population Distribution and Herd Behavior	478
	20.3.4	A Quasi-Homogeneous Model	479
20.4	Wealth 1	Dynamics of Momentum Trading Strategies	481
	20.4.1	Case: $(L_1, L_2) = (3, 5)$	481
	20.4.2	Other Lag Length Combinations	484
20.5	Wealth	Dynamics of Contrarian Trading Strategies	486
	20.5.1	Case: $(L_1, L_2) = (3, 5)$	487
	20.5.2	Other Cases	489
20.6	Conclus	ion	491
20.7	Append	ix	492
	20.7.1	Proof of Proposition 1	492
	20.7.2	Time Series Plots, Statistics	
		and Autocorrelation Results	494

Simulation Methods for Stochastic Differential Equations		
Eckhard Pla	iten	
21.1	Stochastic Differential Equations	501
21.2	Approximation of SDEs	502

21.3	Strong a	nd Weak Convergence	503
21.4	Strong A	Approximation Methods	505
21.5	Weak A	pproximation Methods	506
21.6	Monte (	Carlo Simulation for SDEs	509
21.7	Varianc	e Reduction	510
CHAPTER	22		
Foundation	s of Optio	n Pricing	515
Peter Buche	en		
22.1	Introduc	ction	515
22.2	The PD	E and EMM Methods	517
	22.2.1	Geometrical Brownian Motion	517
	22.2.2	The Black-Scholes pde	518
•	22.2.3	The Equivalent Martingale Measure	519
	22.2.4	Effect of Dividends	521
22.3	Pricing	Simple European Derivatives	521
	22.3.1	Asset and Bond Binaries	522
	22.3.2	European Calls and Puts	524
22.4	Dual-Ex	piry Options	525
	22.4.1	Second-order Binaries	525
	22.4.2	Binary Calls and Puts	527
	22.4.3	Compound Options	528
	22.4.4	Chooser Options	529
22.5	Dual As	set Options.	530
	22.5.1	The Exchange Option	531
	22.5.2	A Simple ESO	532
	22.5.3	Other Two Asset Exotics	532
22.6	Barrier	Options	533
	22.6.1	PDE's for Barrier Options	533
	22.6.2	Image Solutions for the BS-pde	534
	22.6.3	The D/O Barrier Option	535
	22.6.4	Equivalent Pavoffs	535
	22.6.5	Call and Put Barriers	536
22.7	Lookba	ck Ontions	537
	22.7.1	Equivalent Payoffs for Lookback Options	537
	22.7.2	Generic Lookback Options	539
	22.7.3	Floating Strike Lookback Options	540
22.8	Summa	rv	540
22.0	Sammu	·, ······	
CHAPTER	23		
Long-Rang	e Depende	ence, Fractal Processes, and Intra-Daily Data	543
Wei Sun, Sv	vetlozar (Z	ari) Rachev, Frank Fabozzi	

23.1	Introduc	ction	543
23.2	Stylized	Facts of Financial Intra-daily Data	545
	23.2.1	Random Durations	545

	23.2.2	Distributional Properties of Returns	. 545
	23.2.3	Autocorrelation and Seasonality	. 546
	23.2.4	Clustering	. 546
	23.2.5	Long-range Dependence	. 547
23.3	Comput	er Implementation in Studying Intra-daily Data	. 547
	23.3.1	Data Transformation	. 547
	23.3.2	Data Cleaning	. 549
23.4	Research	h on Intra-Daily Data in Finance	. 550
	23.4.1	Studies of Volatility	. 550
	23.4.2	Studies of Liquidity	. 553
	23.4.3	Studies of Market Microstructure	. 554
	23.4.4	Studies of Trade Duration	. 556
23.5	Long-Ra	ange Dependence	. 560
	23.5.1	Estimation and Detection of LRD in Time Domain	. 560
	23.5.2	Estimation and Detection of LRD	
		in Frequency Domain	. 564
	23.5.3	Econometric Modeling of LRD	. 566
23.6	Fractal I	Processes and Long-Range Dependence	. 569
	23.6.1	Specification of the Fractal Processes	. 569
	23.6.2	Estimation of Fractal Processes	. 571
	23.6.3	Simulation of Fractal Processes	. 574
	23.6.4	Implications of Fractal Processes	. 575
23.7	Summar	ry	. 576

( ) (

#### CHAPTER 24.

Bayesian Aj	oplications to the Investment Management Process	587
Biliana Bag	asheva, Svetlozar (Zari) Rachev, John Hsu, Frank Fabozzi	•
24.1	Introduction	587
24.2	The Single-Period Portfolio Problem	587
24.3	Combining Prior Beliefs and Asset Pricing Models	592
24.4	Testing Portfolio Efficiency	596
	24.4.1 Tests Involving Posterior Odds Ratios	597
	24.4.2 Tests Involving Inefficiency Measures	599
24.5	Return Predictability	600
	24.5.1 The Static Portfolio Problem	601
	24.5.2 The Dynamic Portfolio Problem	603
	24.5.3 Model Uncertainty	604
24.6	Conclusion	607

Post-mod	lern Approac	hes for Portfolio Optimization	613
Borjana .	Racheva-Ioto	wa, Stoyan Stoyanov	
25.	.1 Introduc	tion	613
25.	.2 Risk and	I Performance Measures Overview	614
	25.2.1	The Value-at-Risk Measure	616

	25.2.2 Coherent Risk Measures	. 616
	25.2.3 The Conditional Value-at-Risk	. 618
	25.2.4 Performance Measures	. 619
25.3	Heavy-tailed and Asymmetric Models for Assets Returns	. 621
	25.3.1 One-dimensional Models	. 622
	25.3.2 Multivariate Models	. 623
25.4	Strategy Construction Based on CVaR Minimization	. 624
	25.4.1 Long-only Active Strategy	. 625
	25.4.2 Long-short Strategy	. 627
	25.4.3 Zero-dollar Strategy	. 628
	25.4.4 Other Aspects	. 629
25.5	Optimization Example	. 629
25.6	Conclusion	. 633
CHAPTER 2	26	
Applications	s of Heuristics in Finance	. 635
Manfred Gil	lli, Dietmar Maringer, Peter Winker	
26.1	Introduction	. 635
26.2	Heuristics	. 636
	26.2.1 Traditional Numerical vs. Heuristic Methods	. 636
	26.2.2 Some Selected Approaches	. 637
	26.2.3 Further Methods and Principles	. 639
26.3	Applications in Finance	. 642
	26.3.1 Portfolio Optimization	. 642
	26.3.2 Model Selection and Estimation	. 648
26.4	Conclusion	. 651
CHAPTER 2	27	
Kernel Meth	nods in Finance	. 655
Stephan Cha	alun. Andreas Mitschele	
27.1	Introduction	. 655
27.2	Kernelisation	. 657
27.3	Dimensionality Reduction	. 658
	27.3.1 Classical Methods for Dimensionality Reduction	. 658
	27.3.2 Non-linear Dimensionality Reduction	. 661
27.4	Regression	. 664
27.5	Classification	. 666
27.6	Kernels and Parameter Selection	. 668
27.7	Survey of Applications in Finance	. 670
,	27.7.1 Credit Risk Management	. 670
	27.7.2 Market Risk Management	. 673
	27.7.3 Synopsis and Possible Future Application Fields	. 675
27.8	Overview of Software Tools	. 678
27.9	Conclusion	. 679
	/	/

CHAPTER	28		
Complexity	of Exchange Markets	689	
Mao-cheng	Cai, Xiaotie Deng		
28.1	Introduction		
28.2	Definitions and Models	691	
28.3	On Complexity of Arbitrage in a General Market Model	694	
28.4	Polynomial-Time Solvable Models of Exchange Markets	697	
28.5	Arbitrage on Futures Markets	699	
28.6	The Minimum Number of Operations to Eliminate Arbitrage	702	
28.7	Remarks and Discussion	703	
Part III.	Further Aspects and Future Trends		
<b>T</b> ( <b>1</b> ()		700	
Introduction	i to Part III	/09	
	20		
UT Converter	29 Nove Desuissments Desulations and Ammooshes	711	
11 Security:	New Requirements, Regulations and Approaches	/11	
Gunier Mul	Ier, Siejan Sackmann, Oliver Prokein	711	
29.1	Online Services in the Financial Sector	712	
29.2	20.2.1 Integration of Einspeigl Services	712	
	29.2.1 Integration of Financial Services	714	
20.3	Security beyond Access Control	714	
29.3	20.3.1 Security: Protection Goals	714	
	29.3.1 Security: Dependobility	717	
20 /	Security: Policy and Audits	717	
29.4	20 A 1 Security Policies	718	
	29.4.2 Logging Services	721	
29.5	Regulatory Requirements and Security Risks	721	
207.5	29.5.1 Data Protection Laws	722	
	29.5.7 Built Protocolon Burgements	723	
	29.5.3 Managing Security and Privacy Risks	724	
29.6	Conclusion	727	
CHAPTER	30		
Legal Aspec	ets of Internet Banking in Germany	731	
Gerald Spin	dler, Einar Recknagel		
30.1	Introduction	731	
30.2	Contract Law – Establishing Business Connections,		
,	Concluding Contracts, and Consumer Protection	732	
	30.2.1 Establishing the Business Connection	732	
	30.2.2 Contract Law	732	

30.3	30.3 Liability – Duties and Obligations of Bank and Custome				
	30.3.1	Phishing and Its Variations – A Case of Identity	. 736		
	30.3.2	Legal Situation in Case of Phishing or Pharming	. 737		
	30.3.3	Procedural Law and the Burden of Proof	. 746		
CHAPTER 2	31				
Challenges a	and Trend	ls for Insurance Companies	753		
Markus Fro	sch. Joac	him Lauterbach. Markus Warg			
31.1	Starting Position				
31.2	Challen	. 754			
	31.2.1	Business and IT Strategy in the Balanced Scorecard	. 754		
	31.2.2	Self-controlling Systems: Management Based on the			
		Contribution Margin	. 756		
	31.2.3	Unique Selling Propositions: On Demand Insurance	. 759		
	31.2.4	Sales and Marketing Support:			
		Access to Primary Data	. 761		
	31.2.5	Talent Management: Identify, Hire			
		and Develop Talented Staff	. 765		
31.3	Summar	ry and Outlook	. 770		
CILLARTON	22				
CHAPIER .	32	11 Charles Andre in Descent Destroyeting			
Added valu	e and Cha	Einenges of industry-Academic Research Partnerships –	772		
The Example	e of the E	-Finance Lab	. 775		
woijgang K	oenig, Sie	ejan Blumenberg, Sebasilan Martin	772		
32.1	Introduc	cuon	כוו. רדר		
32.2	Structure of the EFL				
52.5	Generat	ton and Sharing of Knowledge Between Science	775		
	and Pra	Destite: Research Cycle	כוו . זרר		
	32.3.1	Problem Definition	. //0		
	32.3.2	Operationalization	. //0		
	32.3.3	Application	. ///		
	32.3.4		. ///		
22.4	32.3.5		. 779		
32.4	Added value and Challenges of the Industry-Academic				
~~~~	Researc	h Partnership	. 783		
32.5	Conclus	ion	. 785		
Index			. 787		

.

,