

Contents

	Preface	xi
	Acknowledgments	xiii
CHAPTER 1	Modeling Market Microstructure—Randomness in Markets	1
	The Random Walk Model	3
	What You Cannot Predict Is Random to You	5
	Market Microstructure	7
	Efficient Market Hypothesis	9
	Arbitrage Pricing Theory	10
CHAPTER 2	Distribution of Price Changes	13
	The Normal Distribution	13
	Reflection Principle	17
	Approximation of the Normal Distribution	
	by Rational Polynomial	18
	Lognormal Distribution	19
	Symmetry of the Normal and Lognormal	22
	Why Pick a Distribution at All?	23
	The Empirical Distribution	24
	The Lognormal as an Approximation	26

CHAPTER 3	Investment Objectives	29
	Statistician's Fair Game	29
	A Fair Game Is a Loser!	30
	Criteria for a Favorable Game	30
	Gambler's Ruin	31
	Optimal Return Models	32
	Markets Are Rational, Psychologists Are Not	34
	The St. Petersburg Paradox	36
	Compounded Return Is the Real Objective	37
	Defining Risk	38
	Minimum Risk Models	41
	Correlation of Assets	41
	Summary of Correlation Relationships	42
	Beta and Alpha	43
	The Efficient Frontier and the Market Portfolio	46
	The Sharpe Ratio	47
	Limitations of Modern Portfolio Theory	48
CHAPTER 4	Modeling Risk Management and Stop-loss Myths	51
	Stop-loss Orders	52
	Stops: Effect on the Mean Return	53
	Stops: Effect on the Probability of Gain	56
	Stops: Probability of Being Stopped Out	56
	Stops: Effect on Variance and Standard Deviation	58
	Effect on Skew	59
	Effect on the Kurtosis	60
	Stop-loss: Summary	61
	Modeling Stops	61
	Identifying When to Use Stops and When <i>Not</i> To	62
	Stop-Profits	64
	Puts and Calls	65
CHAPTER 5	Maximal Compounded Return Model	67
	Optimal Compound Return Models	68
	Relative Returns	68
	Average Stock Returns, but Compound Portfolio Returns	70

Contents

	Logarithms and the Optimal Exponential Growth Model	71
	Position Sizing as the Only Guaranteed Risk Control	71
	Controlling Risk through Optimal Position Sizing	72
	Maximize Compounded Portfolio Return	72
	Maximal Compounded Return Models	73
	What the Model Is and Is Not	74
	Modeling the Empirical Distribution	75
	Correlations	76
	The Enhanced Maximum Investment Formulas	77
	Expected Drawdowns May Be Large	78
CHAPTER 6	Utility Models—Preferences Toward Risk and Return	79
	Basis for a Utility Model	80
	History of Logarithms	81
	Optimal Compounded Utility Model	84
	The Sharpe Ratio	85
	Optimal Model for the Sharpe Ratio	85
	Optimization with Excel Solver	88
CHAPTER 7	Money Management Formulas Using the Joint Multiasset Distribution	93
	The Continuous Theoretical Distributions	94
	Maximal Log Log Model in the Presence of Correlation	94
	Optimal Sharpe Model with Correlation	95
	The Empirical Distribution	96
	Maximal Log Log Model in the Presence of Correlation	97
	Maximizing the Sharpe Ratio in the Presence of Correlation	97
CHAPTER 8	Proper Backtesting for Portfolio Models	101
	Assuring Good Data	102
	Synchronize Data	102
	Use Net Changes <i>Not</i> Levels	103
	Only Use Information from the Past	104
	Predictive Studies versus Nonpredictive Studies	106

	Use Intraday Highs and Lows for Model Accuracy	107
	Adjusted Data May Be Erroneous	108
	Adjusting Your Own Data	109
	Miscellaneous Data Pitfalls	109
	Tabulate and Save the Detailed Results with Dates	110
	Overlapping Dates Are Important for Correlations	110
	Calculate Mean, Standard Deviation, Variance, and Probability of Win	111
	Robust Methods to Find Statistics	111
	Confidence Limits for Robust Statistics	112
CHAPTER 9	The Combined Optimal Portfolio Model	113
	Choosing the Theoretical Distribution	114
	The Empirical Distribution	115
	Selecting Sharpe versus a Log Log Objective Function	116
	Model Simulation	117
	Professional Money Manager versus Private Investor	119
ABOUT THE CD-ROM		121
	Introduction	121
	System Requirements	121
	What's on the CD	122
	Updates to the CD-ROM	124
	Customer Care	124
APPENDIX 1	Table of Values of the Normal Distribution	125
APPENDIX 2	Installing R	129
APPENDIX 3	Introduction to R	131
APPENDIX 4	R Language Definition	233
	Index	295