CONTENTS

	Preface	vii
I CERTA	INTY MODELS	1
Chapter 1	A Model of the Accumulation and	
Allocation	of Wealth by Individuals	3
I.	THE ECONOMIC THEORY OF CHOICE	3
T A	Onnortunities and Preferences	3
I.B.	Representation of Preferences: The Utility Function and	0
1.2.1	Indifference Curves	4
I.B.1.	The axioms of choice and the principle of maximum utility	5
I.B.2.	Indifference curves and the geometrical representation of	
	preferences	7
I.B.3.	The axioms of nonsatiation and convexity	9
I.C.	The Opportunity Set	12
I.D.	Choice Subject to Constraints	13
*I.E.	The Solution in Mathematical Form	15
II.	THE APPLICATION OF THE THEORY OF CHOICE	
	TO THE ALLOCATION OF FINANCIAL RESOURCES	
	OVER TIME	16
II.A.	The Two-Period Case	16
II.A.1.	The objects of choice: standards of living at different points	
	in time	17
*II.A.2.	The properties of $U(c_1, c_2, \ldots, c_i, \ldots)$	19
II. A.3.	Opportunities: resources and capital markets	20
II.A.4.	The opportunity set under perfect capital markets	22
X 11.A.5.	Interest rates and present values	24
II.A.6.	The preferred allocation	21
Ц.В. Ц D 1	Extension to Inree or More lime Periods	40 20
11.D.1. 11 B 9	An equivalent representation in terms of interest rates	29 21
II.D.2. II B 2	Multinerial rates of interest and the concent of the term	01
11. D.J.	structure	34
ILB4	The equal rate of return principle	36
IL.B.5	The n-period opportunity set	38
*II.B.6.	The optimal allocation in the multiperiod case: mathematical	
	treatment	39
II.C.	Conclusion	40
	Appendix: An Illustrative Application of the Wealth Allocation	
	Model: The Life Cycle of Savings	42
I.	THE BASIC FRAMEWORK	42
I.A.	Smoothing Irregularities in the Income Stream	42
		xi

xii Contents

I.B.	Some Specifications and Simplifications	43
I.C.	Consumption, Saving, and Wealth over the Life Cycle	44
I.D.	Consumption and Saving with a Growing Income	47
I.E.	The Effects of Changes in Income and Wealth	51
11.	CONSUMPTION, SAVING, AND THE RATE OF INTEREST	51
II.A.	Some Additional Assumptions: Homogeneity and Its Implications	51
II.B.	Interest Rates and Consumption Decisions over the Life Cycle	53
Chapter 2	Extension of the Model to Durable Commodities,	
Production,	, and Corporations	58
Ι.	DURABLE COMMODITIES AND INVESTMENT	59
I.A.	Representation of the Carry-over Opportunities Provided	
	by Commodity Storage and Production	59
I.B.	The Opportunity Set When Both Commodity Carry-overs	
	and Capital Markets Are Available	61
I.C.	The Case of Production and Investment	62
I.C.1.	The double-tangency solution	62
I.C.2.	Some remaining issues	64
*I.D.	The Solution in the <i>n</i> -Period Case	64
II.	EXTENSION TO THE CASE OF CORPORATIONS	67
II.A.	Management Objectives and Stockholder Preferences	67
≯II.B.	The Market Value Criterion	69
II.B.1.	The case of many owners	70
\times *II.C.	The Market Value Criterion in the General <i>n</i> -Period Case	72
> ^{II.D.}	The Market Value Criterion: Some Problems and	
X	Limitations	73
NII.D.1.	The market value rule and profit maximization	74
× 11.D.2.	The market value rule and management motivation	75
$\chi_{\mathrm{III.}}^{\mathrm{II.D.3.}}$	The criterion problem under imperfect capital markets MARKET VALUE, DIVIDENDS, AND	76
	STOCKHOLDER RETURNS	78
III.A.	The Effect of Dividend Policy	78
III.A.1.	Assumptions, notation, and timing conventions	78
III. A.2.	The equal rate of return principle once again	79
III.B.	The Effects of Dividend Policy on the Market Value of the	
THE O	Snares	80
$\frac{111.0}{111}$	A Graphical Illustration	81
III.D.	The hind in the hand engineers	84
111.D.1. 111 D.9	Dividend policy and the internal rate of actions	84
111.D.2. III F	Some Equivalent Alternative Valuation Formula	80
III.E. III F 1	The stream of dividends appress h	80
111.E.1. 111 F 9	Cash flow and company company contracts	80
111.12.2	Investment opportunities growth and voluction	87
III.F	Growth Potential and Stockholder Deturns	89
	The constant growth model	92
IIL F.2	The growth of total earnings and the growth of dividende	94
	and price per share	04
III F 3	Corporate cornings and investor	94
IV	SUMMADY	96
11.	DUMMAR I	97

	Appendix: Valuation Formulas: Some Numerical Illustrations	100
I. II.	FINANCIAL POLICY, RETURNS, AND VALUATION AN EXAMPLE USING THE CONSTANT GROWTH MODEL	100 104
Chapter 3	Criteria for Optimal Investment Decisions	108
I.	THE REPRESENTATION OF OPTIMAL	
	INVESTMENT DECISIONS	109
I.A.	The Case of a Single Capital Good and Two Time Periods	109
I.B.	Graphical Representation of the Complete Solution	111
I.C.	An Alternative Representation Highlighting the Investment	
	Decision	115
I.C.1.	Alternative forms for the optimizing conditions	117
I.C.2.	Optimal capital stock and optimal investment	118
I.D.	Extension to the Case of Many Different Machines	119
I.E.	The Investment Decision and the Transformation Curve	121
I.F.	Extension to More than Two Time Periods	122
I.F.1.	The case of perfect markets for capital goods	122
I.F.2.	The case of fixed capital	123
11.	INVESTMENT DECISIONS AND CAPITAL BUDGETING	126
II.A.	Problems in the Application of the Present Value Criterion	126
II.A.1.	Marginal versus average present values	127
II.A.2.	Comparing investments with different lives	128
II.B.	Replacement Policies and the Optimal Economic Life of	
	Equipment	130
II.C.	Maximizing Present Value Subject to Constraints	134
II.D.	The Rate of Return Criterion: Uses and Abuses	137
II.D.1.	The discounted cash flow rate of return	137
II.D.2.	Mutually exclusive investments and multiple rates of return	139
II.D.3.	A modified rate of return rule for the mutually exclusive case	140
II.E.	Rate of Return, Rankings of Projects, and Financial Constraints	142
II.F.	Conclusion	143

II UNCERTAINTY MODELS

144

Chapter 4 and the Co	Financing Decisions, Investment Decisions, st of Capital	147
I.	INTRODUCTION	147
II.	MARKET SETTING	148
III.	CAPITAL STRUCTURE AND MARKET VALUES	150
III.A.	Two-Period Market Equilibrium Model	150
III.B.	Multiperiod Model	156
III.C.	Two Partial Equilibrium Treatments	157
III.C.1.	Two-period states of the world model	157
III.C.2.	The market value of a firm in the two-period risk class model	160
III.C.3.	The market value of a firm in a multiperiod risk class model	164
III.C.4.	The effects of financing decisions on the firm's bondholders	
	and shareholders	167
III.C.5.	Summary	170
III.D.	Market Imperfections: The Effects of Tax Laws	170

III.D.2.	The tax deductibility of personal interest payments	174
III.D.3.	Some closing comments on market imperfections	175
IV.	THE FIRM'S OBJECTIVE FUNCTION: THE	
	MARKET VALUE RULE	176
IV.A.	The Market Value Rule: Derivation	176
IV.B.	The Market Value Rule: Implementation	178
v.	THE COST OF CAPITAL AND THE RETURN ON	
	A FIRM'S SHARES	181
V.A.	Discount Rates and the Cost of Capital	181
V.B.	The Expected Return on Common Stock	184
VI.	SUMMARY AND CONCLUSIONS	187
Chapter 5	The Expected Utility Approach to the Problem of	
Choice Und	ler Uncertainty	189
т	INTRODUCTION	189
1. TT	THE EXPECTED UTILITY MODEL CENERAL	100
	ANIOMATIC TREATMENT	100
TT A	The Asian Sustan	190
II.A.	I he Axiom System	194
п.в.	Some Properties of the Utility Functions Implied by the	194
11.0.	Some Properties of the Othity Functions Implied by the	106
TTT		150
111.	WEATTH MODEL	100
TTT 4	WEALTH MODEL	100
III.A.	Ubtaining the Utility of Wealth Function from Axiom 4	199
ш.в.	Usual Types of Utility of Wealth Functions: Risk Aversion,	900
137	Risk Preference, and Risk Neutrality	200
1.	EXPECTED UTILITY AND THE THEORY OF	000
	FINANCE	203
IV.A.	The Multiperiod Expected Utility of Consumption Model	203
IV.В.	Utilities for Consumption Dollars from Utilities for	000
	Consumption Goods	206
v.	CONCLUSION	207
	Appendíx: Statistical Review	209
т	INTRODUCTION	200
л. тт	EXPECTED VALUES OF WEIGHTED SUMS OF	209
14.	RANDOM VARIABLES	200
TTT	THE VARIANCE OF A WEIGHTED SUM OF	200
111.	RANDOM VARIABLES	211
Chapter 6	The Two-Period Consumption-Investment Model	215
I.	INTRODUCTION	215
I.A.	The Mean-Standard Deviation Model: An Overview	210
I.B.	A Familiar Picture	220
II.	THE CONSUMER'S TASTES	220
*II.A.	Portfolio Decisions Based on $E(\tilde{R})$ and $\sigma(\tilde{R})$	222
*II.B.	Marginal Expected Utilities and the Efficient Set Theorem	220
*II.C.	Properties of Indifference Curves in the Two-Parameter Model	224
111.	THE INVESTMENT OPPORTUNITY SET.	044
	TWO-ASSET CASE	000
		228

IV.	THE EFFICIENT SET AND CONSUMER	
	EQUILIBRIUM WITH N ASSETS	233
IV.A.	Definitions and Elementary Expressions for the N-Asset Model	234
IV.B.	Geometric Representation of Consumer Equilibrium	236
*IV.C.	Algebraic Representation of Consumer Equilibrium	243
IV.D.	Some Odds and Ends of the Mean-Standard Deviation Model	250
IV.D.1.	The investment assets to be included in portfolio models	250
IV.D.2.	The effects of diversification: algebraic treatment	253
IV.D.3.	Quadratic utility functions	256
IV.D.4.	Why normality?	259
v.	THE TWO-PARAMETER MODEL WITH	
	SYMMETRIC-STABLE DISTRIBUTIONS OF	
	PORTFOLIO RETURNS	261
V.A.	Properties of Stable Distributions: A Brief Review	261
V.B.	Representation of the Consumer's Tastes: The Efficient	
	Set Theorem	265
V.C.	The Opportunity Set with Stable Return Distributions	267
V.C.1.	The market model	267
V.C.2.	Diversification and the distribution of portfolio return	269
V.C.3.	The efficient set	271
V.C.4.	Consumer equilibrium	273
VI.	CONCLUSIONS	274
Chapter 7	Risk, Return, and Market Equilibrium	276
T.	INTRODUCTION	276
11	THE MARKET SETTING	277
111	RISK AND EXPECTED RETURN FROM THE	
111.	VIEWPOINT OF A CONSUMER	270
TTT A	The Disks of Assots and Portfolion	210
III.A. III B	The Relationship between Risk and Expected Return	213
III.D.	DISK AND EXDECTED RETURN FOR THE MARKET	201
1 V. TX7 A	HER AND EXPECTED REPORT FOR THE MARKET	200
IV.A.	The Pole of a Pickless Asset	201
IV.D.	Let month the	200
IV.C.	Disk and expected action in the peoplet pertiplie	290
1V.C.I.	Homogeneous expected return in the market portions	200
11.0.2.	look	292
v	FOULIEDIUM EXPECTED RETURN AND THE	
۷.	MADZET MALUE OF A FIDM	205
171	MARKET VALUE OF A FIRM	200
V1.	OPTIMAL PRODUCTION DECISIONS BI FIRMS	299
VI.A.	The Firm's Objective Function	299
VI.B.	Optimal Production Decisions: Single-Activity Firms	201
VI.C.	Optimal Production Decisions: Multiple-Activity Firms	304
VI.D.	Optimal Production Decisions: Some Comments	307
*VII.	ALGEBRAIC TREATMENT OF CAPITAL MARKET	
	EQUILIBRIUM	308
VII.A.	Consumer Equilibrium	306
VII.B.	Equilibrium for the Firm	311
VII C	Markat Fauilibrium	312
v11.0.		

xvi Contents

VIII.	MARKET EQUILIBRIUM WITH SYMMETRIC-	
	STABLE RETURN DISTRIBUTIONS	313
VIII.A.	The Market Model Return-Generating Process	313
VIII.B.	Consumer Equilibrium and the Measurement of Risk	314
VIII.C.	Risk and Return for the Market	317
IX.	CONCLUSIONS	318
Chapter 8	Multiperiod Models	321
I.	INTRODUCTION	321
II.	MULTIPERIOD CONSUMPTION-INVESTMENT	
	DECISIONS	322
II.A.	The Problem	322
II.B.	The Wealth Allocation Model	323
II.C.	Implications: Bridging the Gap between Two-Period and	
	Multiperiod Models	326
II.C.1.	The utility of money function	327
II.C.2.	Two-period and multiperiod models: general treatment	327
II.C.3.	A multiperiod setting for two-period two-parameter portfolio	
	models	329
11.C.4	Theorems and proofs	332
▲ III.	EFFICIENT CAPITAL MARKETS	335
X III.A.	Expected Return or Fair Game Models	336
X III.B.	The Submartingale Model	338
X III.C.	The Random Walk Model	339
	Index	343