

---

# Contents

---

## Part I Asset Pricing Framework

---

<b>1</b>	<b>Financial Modeling</b> .....	<b>3</b>
1.1	Continuous-Time Stochastics .....	3
1.1.1	Stochastic Processes and Brownian Motion .....	3
1.1.2	Martingales, Itô Calculus, and Changes of Measure ....	6
1.2	Arbitrage Pricing in Continuous Time .....	9
1.2.1	PDE Approach .....	9
1.2.2	EMM Approach .....	15
<b>2</b>	<b>Estimation Principles</b> .....	<b>21</b>
2.1	State Space Notation .....	21
2.2	Filtering Algorithms .....	24
2.2.1	Filtering Objective .....	25
2.2.2	Optimal Estimator .....	26
2.2.3	Filter Recursions .....	31
2.2.4	Extended Kalman Filtering .....	33
2.3	Parameter Estimation .....	35

---

## Part II Pricing Equities

---

<b>3</b>	<b>Introduction and Survey</b> .....	<b>43</b>
3.1	Opening Remarks .....	43
3.2	Closed-End Funds: Survey and Hypotheses .....	44
<b>4</b>	<b>Valuation Model</b> .....	<b>49</b>
4.1	Characteristics of Closed-End Funds .....	49
4.2	Economic Foundation .....	53

4.3	Pricing Closed-End Fund Shares	56
<b>5</b>	<b>First Empirical Results</b>	<b>59</b>
5.1	Sample Data	59
5.2	Implemented Model	64
5.3	State Space Form	65
5.4	Closed-End Fund Analysis	67
<b>6</b>	<b>Implications for Investment Strategies</b>	<b>75</b>
6.1	Testing the Forecasting Power	75
6.1.1	Setup of Forecasting Study	75
6.1.2	Evidence on Forecasting Quality	77
6.2	Implementing Trading Rules	79
6.2.1	Experimental Design	79
6.2.2	Test Results on Trading Strategies	81
<b>7</b>	<b>Summary and Conclusions</b>	<b>85</b>

---

### Part III Pricing Fixed-Income Securities

---

<b>8</b>	<b>Introduction and Survey</b>	<b>89</b>
8.1	Overview	89
8.2	Bond Prices and Interest Rates	90
8.3	Dynamic Term Structure Models	93
<b>9</b>	<b>Term Structure Model</b>	<b>97</b>
9.1	Modeling an Incomplete Market	97
9.2	Motivation for a Stochastic Risk Premium	98
9.3	Economic Model	101
<b>10</b>	<b>Initial Characteristic Results</b>	<b>105</b>
10.1	Valuing Discount Bonds	105
10.2	Term Structures of Interest Rates and Volatilities	112
10.2.1	Spot and Forward Rate Curves	112
10.2.2	Term Structure of Volatilities	113
10.3	Analysis of Limiting Cases	115
10.3.1	Reducing to an Ornstein-Uhlenbeck Process	115
10.3.2	Examining the Asymptotic Behavior	117
10.4	Possible Shapes of the Term Structures	119

10.4.1	Influences of the State Variables . . . . .	119
10.4.2	Choosing the Model Parameters . . . . .	121
<b>11</b>	<b>Risk Management and Derivatives Pricing . . . . .</b>	<b>127</b>
11.1	Management of Interest Rate Risk . . . . .	127
11.2	Pricing Interest Rate Derivatives . . . . .	129
11.2.1	Bond Options . . . . .	130
11.2.2	Swap Contracts . . . . .	138
11.2.3	Interest Rate Caps and Floors . . . . .	140
<b>12</b>	<b>Calibration to Standard Instruments . . . . .</b>	<b>143</b>
12.1	Estimation Techniques for Term Structure Models . . . . .	143
12.2	Discrete Time Distribution of the State Variables . . . . .	146
12.3	US Treasury Securities . . . . .	149
12.3.1	Data Analysis . . . . .	149
12.3.2	Parameter Estimation . . . . .	155
12.3.3	Analysis of the State Variables . . . . .	160
12.4	Other Liquid Markets . . . . .	163
12.4.1	Appropriate Filtering Algorithm . . . . .	164
12.4.2	Sample Data and Estimation Results . . . . .	165
<b>13</b>	<b>Summary and Conclusions . . . . .</b>	<b>169</b>

---

**Part IV Pricing Electricity Forwards**

---

<b>14</b>	<b>Introduction and Survey . . . . .</b>	<b>173</b>
14.1	Overview . . . . .	173
14.2	Commodity Futures Markets . . . . .	173
14.3	Pricing Commodity Futures . . . . .	176
14.4	Asset Pricing in Electricity Markets . . . . .	181
<b>15</b>	<b>Electricity Pricing Model . . . . .</b>	<b>187</b>
15.1	Model Assumptions and Risk-Neutral Pricing . . . . .	187
15.2	Valuation of Electricity Forwards . . . . .	190
<b>16</b>	<b>Empirical Inference . . . . .</b>	<b>195</b>
16.1	Estimation Model . . . . .	195
16.1.1	Distribution of the State Variables . . . . .	196
16.1.2	State Space Formulation and Kalman Filter Setup . . . . .	199

16.2 Data Analysis and Estimation Results .....	203
<b>17 Summary and Conclusions .....</b>	<b>215</b>
<b>List of Symbols and Notation .....</b>	<b>217</b>
<b>List of Tables .....</b>	<b>221</b>
<b>List of Figures .....</b>	<b>223</b>
<b>References .....</b>	<b>225</b>
<b>Index .....</b>	<b>241</b>