# CONTENTS


PREFACE xv

PART I STATISTICAL METHODOLOGIES 1

1 Preliminaries 3

1.1 Sample, 3
1.2 Winsorization and Truncation, 5
1.3 Newey and West (1987) Adjustment, 6
1.4 Summary, 8
References, 8

2 Summary Statistics 9

2.1 Implementation, 10
2.1.1 Periodic Cross-Sectional Summary Statistics, 10
2.1.2 Average Cross-Sectional Summary Statistics, 12
2.2 Presentation and Interpretation, 12
2.3 Summary, 16

3 Correlation 17

3.1 Implementation, 18
3.1.1 Periodic Cross-Sectional Correlations, 18
3.1.2 Average Cross-Sectional Correlations, 19

3.2 Interpreting Correlations, 20
3.3 Presenting Correlations, 23
3.4 Summary, 24
References, 24

**4 Persistence Analysis** **25**

4.1 Implementation, 26
4.1.1 Periodic Cross-Sectional Persistence, 26
4.1.2 Average Cross-Sectional Persistence, 28
4.2 Interpreting Persistence, 28
4.3 Presenting Persistence, 31
4.4 Summary, 32
References, 32

**5 Portfolio Analysis** **33**

5.1 Univariate Portfolio Analysis, 34
5.1.1 Breakpoints, 34
5.1.2 Portfolio Formation, 37
5.1.3 Average Portfolio Values, 39
5.1.4 Summarizing the Results, 41
5.1.5 Interpreting the Results, 43
5.1.6 Presenting the Results, 45
5.1.7 Analyzing Returns, 47
5.2 Bivariate Independent-Sort Analysis, 52
5.2.1 Breakpoints, 52
5.2.2 Portfolio Formation, 54
5.2.3 Average Portfolio Values, 57
5.2.4 Summarizing the Results, 60
5.2.5 Interpreting the Results, 64
5.2.6 Presenting the Results, 66
5.3 Bivariate Dependent-Sort Analysis, 71
5.3.1 Breakpoints, 71
5.3.2 Portfolio Formation, 74
5.3.3 Average Portfolio Values, 76
5.3.4 Summarizing the Results, 80
5.3.5 Interpreting the Results, 80
5.3.6 Presenting the Results, 81
5.4 Independent Versus Dependent Sort, 85
5.5 Trivariate-Sort Analysis, 87
5.6 Summary, 87
References, 88



**6 Fama and Macbeth Regression Analysis** **89**

6.1 Implementation, 90
6.1.1 Periodic Cross-Sectional Regressions, 90
6.1.2 Average Cross-Sectional Regression Results, 91
6.2 Interpreting FM Regressions, 95
6.3 Presenting FM Regressions, 98
6.4 Summary, 99
References, 99

**PART II THE CROSS SECTION OF STOCK RETURNS** **101**

**7 The CRSP Sample and Market Factor** **103**

7.1 The U.S. Stock Market, 103
7.1.1 The CRSP U.S.-Based Common Stock Sample, 104
7.1.2 Composition of the CRSP Sample, 105
7.2 Stock Returns and Excess Returns, 111
7.2.1 CRSP Sample (1963–2012), 115
7.3 The Market Factor, 115
7.4 The CAPM Risk Model, 120
7.5 Summary, 120
References, 121

**8 Beta** **122**

8.1 Estimating Beta, 123
8.2 Summary Statistics, 126
8.3 Correlations, 128
8.4 Persistence, 129
8.5 Beta and Stock Returns, 131
8.5.1 Portfolio Analysis, 132
8.5.2 Fama–MacBeth Regression Analysis, 140
8.6 Summary, 143
References, 144

**9 The Size Effect** **146**

9.1 Calculating Market Capitalization, 147
9.2 Summary Statistics, 150
9.3 Correlations, 152
9.4 Persistence, 154
9.5 Size and Stock Returns, 155
9.5.1 Univariate Portfolio Analysis, 155

9.5.2 Bivariate Portfolio Analysis, 162
9.5.3 Fama–MacBeth Regression Analysis, 168
9.6 The Size Factor, 171
9.7 Summary, 173
References, 174

**10 The Value Premium** **175**

10.1 Calculating Book-to-Market Ratio, 177
10.2 Summary Statistics, 181
10.3 Correlations, 183
10.4 Persistence, 184
10.5 Book-to-Market Ratio and Stock Returns, 185
10.5.1 Univariate Portfolio Analysis, 185
10.5.2 Bivariate Portfolio Analysis, 190
10.5.3 Fama–MacBeth Regression Analysis, 198
10.6 The Value Factor, 200
10.7 The Fama and French Three-Factor Model, 202
10.8 Summary, 203
References, 203

**11 The Momentum Effect** **206**

11.1 Measuring Momentum, 207
11.2 Summary Statistics, 208
11.3 Correlations, 210
11.4 Momentum and Stock Returns, 211
11.4.1 Univariate Portfolio Analysis, 211
11.4.2 Bivariate Portfolio Analysis, 220
11.4.3 Fama–MacBeth Regression Analysis, 234
11.5 The Momentum Factor, 236
11.6 The Fama, French, and Carhart Four-Factor Model, 238
11.7 Summary, 239
References, 239

**12 Short-Term Reversal** **242**

12.1 Measuring Short-Term Reversal, 243
12.2 Summary Statistics, 243
12.3 Correlations, 243
12.4 Reversal and Stock Returns, 244
12.4.1 Univariate Portfolio Analysis, 244
12.4.2 Bivariate Portfolio Analyses, 249
12.5 Fama–MacBeth Regressions, 263



12.6 The Reversal Factor, 268
12.7 Summary, 270
References, 271

**13 Liquidity** **272**

13.1 Measuring Liquidity, 274
13.2 Summary Statistics, 276
13.3 Correlations, 277
13.4 Persistence, 280
13.5 Liquidity and Stock Returns, 281
13.5.1 Univariate Portfolio Analysis, 281
13.5.2 Bivariate Portfolio Analysis, 288
13.5.3 Fama–MacBeth Regression Analysis, 300
13.6 Liquidity Factors, 308
13.6.1 Stock-Level Liquidity, 309
13.6.2 Aggregate Liquidity, 310
13.6.3 Liquidity Innovations, 312
13.6.4 Traded Liquidity Factor, 312
13.7 Summary, 316
References, 316

**14 Skewness** **319**

14.1 Measuring Skewness, 321
14.2 Summary Statistics, 323
14.3 Correlations, 326
14.3.1 Total Skewness, 326
14.3.2 Co-Skewness, 329
14.3.3 Idiosyncratic Skewness, 330
14.3.4 Total Skewness, Co-Skewness, and Idiosyncratic Skewness, 331
14.3.5 Skewness and Other Variables, 333
14.4 Persistence, 336
14.4.1 Total Skewness, 336
14.4.2 Co-Skewness, 338
14.4.3 Idiosyncratic Skewness, 339
14.5 Skewness and Stock Returns, 341
14.5.1 Univariate Portfolio Analysis, 341
14.5.2 Fama–MacBeth Regressions, 350
14.6 Summary, 359
References, 360

**15 Idiosyncratic Volatility** 363

15.1 Measuring Total Volatility, 365
15.2 Measuring Idiosyncratic Volatility, 366
15.3 Summary Statistics, 367
15.4 Correlations, 370
15.5 Persistence, 380
15.6 Idiosyncratic Volatility and Stock Returns, 381
15.6.1 Univariate Portfolio Analysis, 382
15.6.2 Bivariate Portfolio Analysis, 389
15.6.3 Fama–MacBeth Regression Analysis, 402
15.6.4 Cumulative Returns of $IdioVol^{FF,1M}$ Portfolio, 407
15.7 Summary, 409
References, 410

**16 Liquid Samples** 412

16.1 Samples, 413
16.2 Summary Statistics, 414
16.3 Correlations, 418
16.3.1 CRSP Sample and Price Sample, 418
16.3.2 Price Sample and Size Sample, 420
16.4 Persistence, 421
16.5 Expected Stock Returns, 424
16.5.1 Univariate Portfolio Analysis, 425
16.5.2 Fama–MacBeth Regression Analysis, 435
16.6 Summary, 438
References, 439

**17 Option-Implied Volatility** 441

17.1 Options Sample, 443
17.2 Option-Based Variables, 444
17.2.1 Predictive Variables, 444
17.2.2 Option Returns, 447
17.2.3 Additional Notes, 448
17.3 Summary Statistics, 449
17.4 Correlations, 451
17.5 Persistence, 453
17.6 Stock Returns, 455
17.6.1 *IVolSpread*, *IVolSkew*, and $Vol^{1M} - IVol$, 456
17.6.2 $\Delta IVolC$ and $\Delta IVolP$, 460
17.7 Option Returns, 469
17.8 Summary, 474
References, 474



**18 Other Stock Return Predictors** 477

18.1 Asset Growth, 478
18.2 Investor Sentiment, 479
18.3 Investor Attention, 481
18.4 Differences of Opinion, 482
18.5 Profitability and Investment, 482
18.6 Lottery Demand, 483
References, 484

**INDEX** 489