

The Economics of Financial Markets

The Economics of Financial Markets presents a concise overview of capital markets, suitable for advanced undergraduates and for embarking graduate students in financial economics. Following a brief overview of financial markets – their microstructure and the randomness of stock market prices – this textbook explores how the economics of uncertainty can be applied to financial decision making. The mean-variance model of portfolio selection is discussed in detail, with analysis extended to the capital asset pricing model (CAPM). Arbitrage plays a pivotal role in finance and is studied in a variety of contexts, including the arbitrage pricing theory (APT) model of asset prices. Methods for the empirical evaluation of the CAPM and APT are also discussed, together with the volatility of asset prices, the intertemporal CAPM and the equity premium puzzle. An analysis of bond contracts leads into an assessment of theories of the term structure of interest rates. Finally, financial derivatives are explored, focusing on futures and options contracts.

Roy E. Bailey is a Reader in Economics at the University of Essex.

Cambridge University Press
978-0-521-84827-5 - The Economics of Financial Markets
Roy E. Bailey
Frontmatter
[More information](#)

Cambridge University Press
978-0-521-84827-5 - The Economics of Financial Markets
Roy E. Bailey
Frontmatter
[More information](#)

The Economics of Financial Markets

Roy E. Bailey



Cambridge University Press
978-0-521-84827-5 - The Economics of Financial Markets
Roy E. Bailey
Frontmatter
[More information](#)

CAMBRIDGE
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9780521612807

© R. E. Bailey 2005

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2005
11th printing 2014

Printed in the United Kingdom by Clays, St Ives, plc.

A catalogue record for this publication is available from the British Library

ISBN 978-0-521-84827-5 Hardback
ISBN 978-0-521-61280-7 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate. Information regarding prices, travel timetables and other factual information given in this work are correct at the time of first printing but Cambridge University Press does not guarantee the accuracy of such information thereafter.

The Theory of Economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its possessor to draw correct conclusions. It is not difficult in the sense in which mathematical and scientific techniques are difficult; but the fact that its modes of expression are much less precise than these, renders decidedly difficult the task of conveying it correctly to the minds of learners.

J. M. Keynes

When you set out for distant Ithaca,
fervently wish your journey may be long, –
full of adventures and with much to learn.

C. P. Cavafy

Cambridge University Press
978-0-521-84827-5 - The Economics of Financial Markets
Roy E. Bailey
Frontmatter
[More information](#)

Contents in brief

<i>Contents</i>	<i>page</i>	ix
<i>List of Figures</i>		xv
<i>Preface</i>		xvii
1 Asset markets and asset prices		1
2 Asset market microstructure		33
3 Predictability of prices and market efficiency		56
4 Decision making under uncertainty		83
5 Portfolio selection: the mean-variance model		114
6 The capital asset pricing model		143
7 Arbitrage		166
8 Factor models and the arbitrage pricing theory		183
9 Empirical appraisal of the CAPM and APT		200
10 Present value relationships and price variability		222
11 Intertemporal choice and the equity premium puzzle		250
12 Bond markets and fixed-interest securities		281
13 Term structure of interest rates		306
14 Futures markets I: fundamentals		336
15 Futures markets II: speculation and hedging		363
16 Futures markets III: applications		393
17 Swap contracts and swap markets		417
18 Options markets I: fundamentals		438
19 Options markets II: price determination		467
20 Options markets III: applications		494

Cambridge University Press
978-0-521-84827-5 - The Economics of Financial Markets
Roy E. Bailey
Frontmatter
[More information](#)

Contents

<i>List of figures</i>	<i>page xv</i>
<i>Preface</i>	xvii
1 Asset markets and asset prices	1
1.1 Capital markets	2
1.2 Asset price determination: an introduction	5
1.3 The role of expectations	9
1.4 Performance risk, margins and short-selling	11
1.5 Arbitrage	15
1.6 The role of time	20
1.7 Asset market efficiency	22
1.8 Summary	23
Appendix 1.1: Averages and indexes of stock prices	24
Appendix 1.2: Real rates of return	28
Appendix 1.3: Continuous compounding and the force of interest	29
<i>References</i>	32
2 Asset market microstructure	33
2.1 Financial markets: functions and participants	34
2.2 Trading mechanisms	36
2.3 Industrial organization of financial markets	41
2.4 Trading and asset prices in a call market	45
2.5 Bid–ask spreads: inventory-based models	48
2.6 Bid–ask spreads: information-based models	49
2.7 Summary	52
<i>References</i>	54

x	<i>Contents</i>	
3	Predictability of prices and market efficiency	56
	3.1 Using the past to predict the future	57
	3.2 Informational efficiency	64
	3.3 Patterns of information	70
	3.4 Asset market anomalies	72
	3.5 Event studies	75
	3.6 Summary	77
	Appendix 3.1: The law of iterated expectations and martingales	79
	<i>References</i>	81
4	Decision making under uncertainty	83
	4.1 The state-preference approach	85
	4.2 The expected utility hypothesis	90
	4.3 Behavioural alternatives to the EUH	98
	4.4 The mean-variance model	101
	4.5 Summary	105
	Appendix 4.1: Useful notation	107
	Appendix 4.2: Derivation of the FVR	108
	Appendix 4.3: Implications of complete asset markets	109
	Appendix 4.4: Quadratic von Neumann–Morgenstern utility	110
	Appendix 4.5: The FVR in the mean-variance model	111
	<i>References</i>	112
5	Portfolio selection: the mean-variance model	114
	5.1 Mean-variance analysis: concepts and notation	115
	5.2 Portfolio frontier: two risky assets	118
	5.3 Portfolio frontier: many risky assets and no risk-free asset	121
	5.4 Portfolio frontier: many risky assets with a risk-free asset	125
	5.5 Optimal portfolio selection in the mean-variance model	131
	5.6 Summary	133
	Appendix 5.1: Numerical example: two risky assets	134
	Appendix 5.2: Variance minimization: risky assets only	135
	Appendix 5.3: Variance minimization with a risk-free asset	139
	Appendix 5.4: Derivation of $\Delta\sigma_P = \beta_{jP}\sigma_P\Delta a_j$	140
	Appendix 5.5: The optimal portfolio with a single risky asset	141
	<i>References</i>	142

Contents

xi

6	The capital asset pricing model	143
	6.1 Assumptions of the CAPM	144
	6.2 Asset market equilibrium	145
	6.3 The characteristic line and the market model	149
	6.4 The security market line	151
	6.5 Risk premia and diversification	154
	6.6 Extensions	157
	6.7 Summary	159
	Appendix 6.1: The CAPM in terms of asset prices	160
	Appendix 6.2: Linear dependence of ε_j in the CAPM	162
	Appendix 6.3: The CAPM when all assets are risky	162
	<i>References</i>	165
7	Arbitrage	166
	7.1 Arbitrage in theory and practice	166
	7.2 Arbitrage in an uncertain world	168
	7.3 State prices and the risk-neutral valuation relationship	173
	7.4 Summary	176
	Appendix 7.1: Implications of the arbitrage principle	177
	<i>References</i>	182
8	Factor models and the arbitrage pricing theory	183
	8.1 Factor models	184
	8.2 APT	187
	8.3 Predictions of the APT	190
	8.4 Summary	194
	Appendix 8.1: The APT in a multifactor model	195
	Appendix 8.2: The APT in an exact single-factor model	197
	<i>References</i>	199
9	Empirical appraisal of the CAPM and APT	200
	9.1 The CAPM	201
	9.2 Tests of the CAPM: time series	202
	9.3 Tests of the CAPM: cross-sections	206
	9.4 Sharpe ratios and Roll's criticism	214
	9.5 Multiple-factor models and the APT	215
	9.6 Summary	219
	Appendix 9.1: The Black CAPM in terms of excess returns	220
	<i>References</i>	221
10	Present value relationships and price variability	222
	10.1 Net present value	223
	10.2 Asset price volatility	228

xii	<i>Contents</i>	
	10.3 Behavioural finance, noise trading and models of dividend growth	235
	10.4 Extreme asset price fluctuations	237
	10.5 Summary	243
	Appendix 10.1: Present values in continuous time	245
	Appendix 10.2: Infinitely lived assets: constant growth	246
	Appendix 10.3: The RNVR with multiple time periods	246
	<i>References</i>	248
11	Intertemporal choice and the equity premium puzzle	250
	11.1 Consumption and investment in a two-period world with certainty	251
	11.2 Uncertainty, multiple assets and long time horizons	254
	11.3 Lifetime portfolio selection	258
	11.4 The equity premium puzzle and the risk-free rate puzzle	262
	11.5 Intertemporal capital asset pricing models	269
	11.6 Summary	273
	Appendix 11.1: Intertemporal consumption and portfolio selection	274
	Appendix 11.2: Simplifying the FVR	276
	Appendix 11.3: The consumption CAPM	278
	<i>References</i>	280
12	Bond markets and fixed-interest securities	281
	12.1 What defines a bond?	282
	12.2 Zero-coupon bonds	286
	12.3 Coupon-paying bonds	291
	12.4 Bond valuation	295
	12.5 Risks in bond portfolios	297
	12.6 Immunization of bond portfolios	298
	12.7 Summary	300
	Appendix 12.1: Some algebra of bond yields	302
	<i>References</i>	305
13	Term structure of interest rates	306
	13.1 Yield curves	307
	13.2 Index-linked bonds	310
	13.3 Implicit forward rates	313
	13.4 The expectations hypothesis of the term structure	317
	13.5 Allowing for risk preferences in the term structure	322
	13.6 Arbitrage and the term structure	326
	13.7 Summary	328

	<i>Contents</i>	xiii
Appendix 13.1: The expectations hypothesis with explicit uncertainty		329
Appendix 13.2: Risk aversion and bond portfolios		331
<i>References</i>		334
14 Futures markets I: fundamentals		336
14.1 Forward contracts and futures contracts		337
14.2 The operation of futures markets		342
14.3 Arbitrage between spot and forward prices		349
14.4 Arbitrage in foreign exchange markets		354
14.5 Repo markets		355
14.6 Summary and conclusion		357
Appendix 14.1: Forward and futures prices		359
Appendix 14.2: Revaluation of a forward contract		360
<i>References</i>		362
15 Futures markets II: speculation and hedging		363
15.1 Speculation		363
15.2 Hedging strategies		365
15.3 Optimal hedging		374
15.4 Theories of futures prices		378
15.5 Manipulation of futures markets		383
15.6 Summary		386
Appendix 15.1: Futures investment as portfolio selection		387
Appendix 15.2: Derivation of \tilde{h}		390
<i>References</i>		392
16 Futures markets III: applications		393
16.1 Weather futures		393
16.2 Financial futures contracts		397
16.3 Short-term interest rate futures		400
16.4 Long-term interest rate, or bond, futures		404
16.5 Stock index futures		406
16.6 The fall of Barings Bank		412
16.7 Summary		414
<i>References</i>		416
17 Swap contracts and swap markets		417
17.1 Swap agreements: the fundamentals		417
17.2 Why do swaps occur?		423
17.3 Risks associated with swaps		429
17.4 Valuation of swaps		429

xiv	<i>Contents</i>	
	17.5 Metallgesellschaft: a case study	431
	17.6 Summary	435
	<i>References</i>	437
18	Options markets I: fundamentals	438
	18.1 Call options and put options	439
	18.2 Varieties of options	446
	18.3 Option-like assets	448
	18.4 Upper and lower bounds for option prices	449
	18.5 Put-call parity for European options	454
	18.6 The Modigliani–Miller theorem	457
	18.7 Summary	459
	Appendix 18.1: Lower bound for a European call option premium	460
	Appendix 18.2: Lower bound for a European put option premium	461
	Appendix 18.3: Put-call parity for European options	462
	Appendix 18.4: The Modigliani–Miller theorem: a proof	463
	<i>References</i>	466
19	Options markets II: price determination	467
	19.1 The fundamentals of option price models	468
	19.2 A two-state option-pricing model	471
	19.3 The Black–Scholes model	480
	19.4 Contingent claims analysis	486
	19.5 Summary	490
	<i>References</i>	492
20	Options markets III: applications	494
	20.1 Stock index options	495
	20.2 Options on futures contracts	496
	20.3 Interest rate options	500
	20.4 Options and portfolio risks	504
	20.5 Portfolio insurance	507
	20.6 Combinations and spreads	512
	20.7 Summary	514
	Appendix 20.1: Put-call parity for European options on futures	515
	<i>References</i>	518
	<i>Subject index</i>	519
	<i>Author index</i>	526

Figures

1.1	Market equilibrium for a single asset	6
2.1	Flow demand and supply for a single asset	37
3.1	A method for appraising asset market efficiency	67
4.1	States in a two-period world	87
4.2	The value function, $z(W)$, in prospect theory	100
4.3	Indifference curves in μ_p, σ_p space	104
5.1	The efficiency frontier with two assets	119
5.2	The efficiency frontier with two assets and $\rho_{12} = \pm 1$	119
5.3	The efficiency frontier allowing for short-sales	120
5.4	The efficiency frontier with three assets	122
5.5	Efficient portfolios with a risk-free asset	126
5.6	Efficient portfolios with different lending and borrowing rates	128
5.7	The Sharpe ratio and risk-adjusted performance	131
5.8	Optimal portfolio selection	132
5.9	The portfolio frontier with risky assets	137
6.1	The capital market line	147
6.2	The characteristic line for asset j	150
6.3	The security market line	152
6.4	Disequilibrium in the CAPM	153
6.5	Zero-beta portfolios	158
8.1	A single-factor model	185
8.2	The APT in a single-factor model	191
9.1	A test of the CAPM	208
10.1	Observed US stock prices, \tilde{p}_t , and <i>ex post</i> rational prices, \tilde{p}_t^*	232
11.1	Two-period consumption plans	253
12.1	A zero-coupon bond's price, p , as a function of its yield, y	289
13.1	Yield curves	308
13.2	Estimated yield curves	309

xvi	<i>List of figures</i>	
13.3	Estimated real yield curves	312
14.1	Pay-offs from long and short futures positions	345
15.1	The slope of the fitted line is an estimate of the pure hedge ratio, h^*	376
18.1	Pay-offs at exercise for call and put options: long positions	443
18.2	Pay-offs at exercise for call and put options: short positions	444
18.3	Absence of arbitrage opportunities (AoAO) regions for European options	452
18.4	Bounds for American and European put option prices	456
19.1	Call and put option prices as a function of the asset price, S	470
19.2	The pattern of underlying asset prices: the two-period case	477
19.3	Sample paths for asset prices in continuous time	479
20.1	Interest rate caps and floors	501
20.2	Portfolio insurance with a put option	509
20.3	A long straddle	514

Preface

How can yet another book on finance be justified? The field is already well served with advanced works, many of impressive technical erudition. And, towards the other end of the academic spectrum, an abundance of mammoth texts saturates the MBA market. For the general reader, manuals confidently promising investment success compete with sensational diagnoses of financial upheavals to attract attention from the gullible, avaricious or unwary.

Alas, no one can expect to make a fortune as a consequence of reading this book. It has a more modest objective, namely to explore the economics of financial markets, at an ‘intermediate’ level – roughly that appropriate for advanced undergraduates. It is a work of exposition, not of original research. It unashamedly follows Keynes’s immortal characterization of economic theory as ‘an apparatus of the mind, a technique of thinking’. Principles – rather than assertions of doctrine, policy pronouncements or institutional description – are the focus of attention. If the following chapters reveal no get-rich-quick recipes, they should at least demonstrate why all such nostrums merit unequivocal disbelief.

This book evolved, over more years than the author cares to admit, from lecture notes for a course in financial economics taught at the University of Essex. For reasons of space, one topic – corporate finance – has been omitted from the book, though its core insight – the Modigliani–Miller theorem – is slipped in under options (chapter 18, section 6). While the chapters are intended to follow a logical sequence, pedagogy may require a different order. Any such tensions should be straightforward to resolve. For example, chapter 2 (market microstructure) appears early but was covered later in the course. Other changes of the order in which the chapters are studied should be easy to implement. Several obvious groupings are, however, readily apparent: portfolio selection in chapters 4 and 5; asset pricing in 6 to 9; bond markets in 12 and 13; futures in 14 to 16; and options in 18 to 20.

Taxing though it may be, chapter 7, on arbitrage, is so fundamental that it deserves study as early as possible. The overused and commonly abused notion of ‘efficiency’ infects much of finance: here it is confronted in chapter 3, though its presence cannot escape notice elsewhere (especially in chapters 10 and 11). ‘Behavioural finance’ perhaps warrants greater attention than it gets. Rather than segregate the topic into a ghetto of its own, an attempt is made to disperse its message across chapters of particular relevance (especially 3, 4 and 10). No apology is offered for adhering to a conventional treatment of financial markets, eschewing as far as possible the caprice of academic fashion.

Students enrolled for the lecture course were absolved responsibility for the technical appendices, included to justify and amplify claims in the text. The appendices were much the most satisfying sections to write and, it is hoped, will interest at least those readers embarking on graduate study. Lest there be misconception that the coverage of any topic is definitive, each chapter includes brief suggestions for further reading. A student’s work is never done.

The undergraduates to whom the lectures were addressed had a background in economics but most had not previously encountered the subject of finance. Consequently, while the book should be accessible to any moderately well-educated undergraduate, an acquaintance with microeconomics and quantitative methods is desirable. No more than the rudiments of differential calculus and probability theory, together with a smattering of statistics, are really necessary.

Successive generations of Essex students have contributed more to the final product than they can possibly have realized. Their toleration resembles that of opera audiences, which, in repeatedly shouting for an encore, imagine that the singer will eventually get it right. Individuals – too many to identify by name – have pointed out errors, queried obscurities and, most importantly, asked critical questions that revealed shortcomings. Attempts have been made to remedy the most glaring faults. Others undoubtedly lurk, as yet undiscovered.

A Website has been established at www.cambridge.org/0521612802. It is intended that this will form a repository for updates, feedback, exercises used in the lecture course and other supporting ancillary material. Given the unpredictable appearance, disappearance and revision of Web URLs, with a few exceptions these have been omitted from the text. The book’s Website should – notwithstanding the vicissitudes of the Web – enable rapid access to relevant locations via the links listed there.

The author’s procrastination in completing the manuscript would have exhausted the patience of a saint. But not of Patrick McCartan and Chris Harrison, at Cambridge University Press, the forbearance of whom has been remarkable. Persistent encouragement from Marcus Chambers and Abhinay Muthoo nudged the project back to life on countless occasions when the author would have

Preface

xix

cheerfully abandoned it. Without their unwavering support, the entire enterprise would surely have been aborted. They must, therefore, be rendered partially culpable for the appearance of the book, though they are innocent of its remaining blemishes, infelicities and errors. For these, the author accepts exclusive responsibility.

R. E. Bailey
Wivenhoe Park
November 2004