



CFA Institute

CFA INSTITUTE INVESTMENT SERIES

Fourth Edition

Fixed Income Analysis

WILEY

FIXED INCOME ANALYSIS

CFA Institute is the premier association for investment professionals around the world, with more than 150,000 CFA charterholders worldwide in 165+ countries and regions. Since 1963 the organization has developed and administered the renowned Chartered Financial Analyst® Program. With a rich history of leading the investment profession, CFA Institute has set the highest standards in ethics, education, and professional excellence within the global investment community and is the foremost authority on investment profession conduct and practice. Each book in the CFA Institute Investment Series is geared toward industry practitioners along with graduate-level finance students and covers the most important topics in the industry. The authors of these cutting-edge books are themselves industry professionals and academics and bring their wealth of knowledge and expertise to this series.

FIXED INCOME ANALYSIS

Fourth Edition

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WILEY

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CONTENTS

Preface	xv
Acknowledgments	xvii
About the CFA Institute Series	xix
PART I	
Fixed Income Essentials	
CHAPTER 1	3
Fixed-Income Securities: Defining Elements	3
Learning Outcomes	3
1. Introduction	3
2. Overview of a Fixed-Income Security	4
2.1. Basic Features of a Bond	5
2.2. Yield Measures	10
3. Legal, Regulatory, and Tax Considerations	10
3.1. Bond Indenture	10
3.2. Legal and Regulatory Considerations	18
3.3. Tax Considerations	21
4. Structure of a Bond's Cash Flows	23
4.1. Principal Repayment Structures	23
4.2. Coupon Payment Structures	28
5. Bonds with Contingency Provisions	34
5.1. Callable Bonds	34
5.2. Puttable Bonds	36
5.3. Convertible Bonds	37
6. Summary	40
Practice Problems	42

CHAPTER 2	47
Fixed-Income Markets: Issuance, Trading, and Funding	47
Learning Outcomes	47
1. Introduction	47
2. Overview of Global Fixed-Income Markets	48
2.1. Classification of Fixed-Income Markets	48
2.2. Fixed-Income Indexes	55
2.3. Investors in Fixed-Income Securities	56
3. Primary and Secondary Bond Markets	57
3.1. Primary Bond Markets	58
3.2. Secondary Bond Markets	62
4. Sovereign Bonds	65
4.1. Characteristics of Sovereign Bonds	65
4.2. Credit Quality of Sovereign Bonds	66
4.3. Types of Sovereign Bonds	66
5. Non-Sovereign Government, Quasi-Government, and Supranational Bonds	68
5.1. Non-Sovereign Bonds	68
5.2. Quasi-Government Bonds	69
5.3. Supranational Bonds	69
6. Corporate Debt	70
6.1. Bank Loans and Syndicated Loans	71
6.2. Commercial Paper	71
6.3. Corporate Notes and Bonds	74
7. Structured Financial Instruments	79
7.1. Capital Protected Instruments	79
7.2. Yield Enhancement Instruments	79
7.3. Participation Instruments	80
7.4. Leveraged Instruments	80
8. Short-Term Funding Alternatives Available to Banks	82
8.1. Retail Deposits	82
8.2. Short-Term Wholesale Funds	82
8.3. Repurchase and Reverse Repurchase Agreements	84
9. Summary	87
Practice Problems	89
 CHAPTER 3	 93
Introduction to Fixed-Income Valuation	93
Learning Outcomes	93
1. Introduction	93
2. Bond Prices and the Time Value of Money	94
2.1. Bond Pricing with a Market Discount Rate	94
2.2. Yield-to-Maturity	98
2.3. Relationships between the Bond Price and Bond Characteristics	100
2.4. Pricing Bonds with Spot Rates	104

3.	Prices and Yields: Conventions for Quotes and Calculations	107
3.1.	Flat Price, Accrued Interest, and the Full Price	107
3.2.	Matrix Pricing	111
3.3.	Annual Yields for Varying Compounding Periods in the Year	114
3.4.	Yield Measures for Fixed-Rate Bonds	118
3.5.	Yield Measures for Floating-Rate Notes	121
3.6.	Yield Measures for Money Market Instruments	125
4.	The Maturity Structure of Interest Rates	130
5.	Yield Spreads	138
5.1.	Yield Spreads over Benchmark Rates	138
5.2.	Yield Spreads over the Benchmark Yield Curve	140
6.	Summary	143
	Practice Problems	145

CHAPTER 4

Introduction to Asset-Backed Securities 153

	Learning Outcomes	153
1.	Introduction	153
2.	Benefits of Securitization for Economies and Financial Markets	154
3.	How Securitization Works	155
3.1.	An Example of a Securitization	156
3.2.	Parties to a Securitization and Their Roles	157
3.3.	Structure of a Securitization	159
3.4.	Key Role of the Special Purpose Entity	161
4.	Residential Mortgage Loans	164
4.1.	Maturity	165
4.2.	Interest Rate Determination	165
4.3.	Amortization Schedule	166
4.4.	Prepayment Options and Prepayment Penalties	167
4.5.	Rights of the Lender in a Foreclosure	167
5.	Residential Mortgage-Backed Securities	169
5.1.	Mortgage Pass-Through Securities	170
5.2.	Collateralized Mortgage Obligations	175
5.3.	Non-agency Residential Mortgage-Backed Securities	182
6.	Commercial Mortgage-Backed Securities	182
6.1.	Credit Risk	183
6.2.	CMBS Structure	183
7.	Non-Mortgage Asset-Backed Securities	187
7.1.	Auto Loan ABS	187
7.2.	Credit Card Receivable ABS	190
8.	Collateralized Debt Obligations	191
8.1.	CDO Structure	192
8.2.	An Example of a CDO Transaction	192
9.	Summary	195
	Practice Problems	197

CHAPTER 5	
Understanding Fixed Income Risk and Return	203
Learning Outcomes	203
1. Introduction	204
2. Sources of Return	204
3. Interest Rate Risk on Fixed-Rate Bonds	212
3.1. Macaulay, Modified, and Approximate Duration	212
3.2. Effective Duration	220
3.3. Key Rate Duration	224
3.4. Properties of Bond Duration	224
3.5. Duration of a Bond Portfolio	230
3.6. Money Duration of a Bond and the Price Value of a Basis Point	233
3.7. Bond Convexity	235
4. Interest Rate Risk and the Investment Horizon	245
4.1. Yield Volatility	245
4.2. Investment Horizon, Macaulay Duration, and Interest Rate Risk	247
5. Credit and Liquidity Risk	251
6. Summary	252
Practice Problems	255
CHAPTER 6	
Fundamentals of Credit Analysis	261
Learning Outcomes	261
1. Introduction	261
2. Credit Risk	262
3. Capital Structure, Seniority Ranking, and Recovery Rates	264
3.1. Capital Structure	264
3.2. Seniority Ranking	265
3.3. Recovery Rates	267
4. Rating Agencies, Credit Ratings, and Their Role in the Debt Markets	270
4.1. Credit Ratings	271
4.2. Issuer vs. Issue Ratings	273
4.3. Risks in Relying on Agency Ratings	274
5. Traditional Credit Analysis: Corporate Debt Securities	279
5.1. Credit Analysis vs. Equity Analysis: Similarities and Differences	280
5.2. The Four Cs of Credit Analysis: A Useful Framework	280
6. Credit Risk vs. Return: Yields and Spreads	298
7. Special Considerations of High-Yield, Sovereign, and Non-Sovereign Credit Analysis	307
7.1. High Yield	307
7.2. Sovereign Debt	315
7.3. Non-Sovereign Government Debt	319
8. Summary	321
Practice Problems	324

PART II**Fixed Income Term Structure, Advanced Valuation and Credit Analysis****CHAPTER 7****The Term Structure and Interest Rate Dynamics 335**

Learning Outcomes	335
1. Introduction	336
2. Spot Rates and Forward Rates	336
2.1. The Forward Rate Model	338
2.2. Yield to Maturity in Relation to Spot Rates and Expected and Realized Returns on Bonds	346
2.3. Yield Curve Movement and the Forward Curve	349
2.4. Active Bond Portfolio Management	351
3. The Swap Rate Curve	355
3.1. The Swap Rate Curve	355
3.2. Why Do Market Participants Use Swap Rates When Valuing Bonds?	356
3.3. How Do Market Participants Use the Swap Curve in Valuation?	357
3.4. The Swap Spread	360
3.5. Spreads as a Price Quotation Convention	362
4. Traditional Theories of the Term Structure of Interest Rates	364
4.1. Local Expectations Theory	364
4.2. Liquidity Preference Theory	365
4.3. Segmented Markets Theory	366
4.4. Preferred Habitat Theory	366
5. Modern Term Structure Models	369
5.1. Equilibrium Term Structure Models	369
5.2. Arbitrage-Free Models: The Ho–Lee Model	374
6. Yield Curve Factor Models	377
6.1. A Bond's Exposure to Yield Curve Movement	377
6.2. Factors Affecting the Shape of the Yield Curve	378
6.3. The Maturity Structure of Yield Curve Volatilities	382
6.4. Managing Yield Curve Risks	383
7. Summary	386
References	387
Practice Problems	387

CHAPTER 8**The Arbitrage-Free Valuation Framework 397**

Learning Outcomes	397
1. Introduction	397
2. The Meaning of Arbitrage-Free Valuation	398
2.1. The Law of One Price	399
2.2. Arbitrage Opportunity	399
2.3. Implications of Arbitrage-Free Valuation for Fixed-Income Securities	400

3.	Interest Rate Trees and Arbitrage-Free Valuation	401
3.1.	The Binomial Interest Rate Tree	403
3.2.	What Is Volatility and How Is It Estimated?	407
3.3.	Determining the Value of a Bond at a Node	408
3.4.	Constructing the Binomial Interest Rate Tree	410
3.5.	Valuing an Option-Free Bond with the Tree	417
3.6.	Pathwise Valuation	419
4.	Monte Carlo Method	423
5.	Summary	425
	Practice Problems	426

CHAPTER 9

Valuation and Analysis of Bonds with Embedded Options 435

	Learning Outcomes	435
1.	Introduction	436
2.	Overview of Embedded Options	436
2.1.	Simple Embedded Options	437
2.2.	Complex Embedded Options	438
3.	Valuation and Analysis of Callable and Puttable Bonds	441
3.1.	Relationships between the Values of a Callable or Puttable Bond, Straight Bond, and Embedded Option	441
3.2.	Valuation of Default-Free and Option-Free Bonds: A Refresher	442
3.3.	Valuation of Default-Free Callable and Puttable Bonds in the Absence of Interest Rate Volatility	443
3.4.	Effect of Interest Rate Volatility on the Value of Callable and Puttable Bonds	446
3.5.	Valuation of Default-Free Callable and Puttable Bonds in the Presence of Interest Rate Volatility	451
3.6.	Valuation of Risky Callable and Puttable Bonds	459
4.	Interest Rate Risk of Bonds with Embedded Options	465
4.1.	Duration	465
4.2.	Effective Convexity	472
5.	Valuation and Analysis of Capped and Floored Floating-Rate Bonds	475
5.1.	Valuation of a Capped Floater	475
5.2.	Valuation of a Floored Floater	478
6.	Valuation and Analysis of Convertible Bonds	480
6.1.	Defining Features of a Convertible Bond	481
6.2.	Analysis of a Convertible Bond	483
6.3.	Valuation of a Convertible Bond	487
6.4.	Comparison of the Risk–Return Characteristics of a Convertible Bond, the Straight Bond, and the Underlying Common Stock	488
7.	Bond Analytics	492
8.	Summary	493

References	495
Practice Problems	495
CHAPTER 10	
Credit Analysis Models	507
Learning Outcomes	507
1. Introduction	507
2. Modeling Credit Risk and the Credit Valuation Adjustment	508
3. Credit Scores and Credit Ratings	517
4. Structural and Reduced-Form Credit Models	522
5. Valuing Risky Bonds in an Arbitrage-Free Framework	526
6. Interpreting Changes in Credit Spreads	542
7. The Term Structure of Credit Spreads	548
8. Credit Analysis for Securitized Debt	554
9. Summary	558
References	559
Practice Problems	560
CHAPTER 11	
Credit Default Swaps	569
Learning Outcomes	569
1. Introduction	569
2. Basic Definitions and Concepts	570
2.1. Types of CDS	571
2.2. Important Features of CDS Markets and Instruments	572
2.3. Credit and Succession Events	574
2.4. Settlement Protocols	575
2.5. CDS Index Products	577
2.6. Market Characteristics	578
3. Basics of Valuation and Pricing	580
3.1. Basic Pricing Concepts	581
3.2. The Credit Curve	584
3.3. CDS Pricing Conventions	585
3.4. Valuation Changes in CDS during Their Lives	587
3.5. Monetizing Gains and Losses	588
4. Applications of CDS	589
4.1. Managing Credit Exposures	590
4.2. Valuation Differences and Basis Trading	594
5. Summary	596
Practice Problems	597
PART III	
Fixed Income Portfolio Management	

CHAPTER 12	
Overview of Fixed-Income Portfolio Management	605
Learning Outcomes	605
1. Introduction	605
2. Roles of Fixed-Income Securities in Portfolios	606
2.1. Diversification Benefits	606
2.2. Benefits of Regular Cash Flows	608
2.3. Inflation Hedging Potential	609
3. Fixed-Income Mandates	611
3.1. Liability-Based Mandates	611
3.2. Total Return Mandates	615
4. Bond Market Liquidity	619
4.1. Liquidity among Bond Market Sub-Sectors	620
4.2. The Effects of Liquidity on Fixed-Income Portfolio Management	621
5. A Model for Fixed-Income Returns	622
5.1. Decomposing Expected Returns	623
5.2. Estimation of the Inputs	626
5.3. Limitations of the Expected Return Decomposition	627
6. Leverage	628
6.1. Using Leverage	628
6.2. Methods for Leveraging Fixed-Income Portfolios	629
6.3. Risks of Leverage	632
7. Fixed-Income Portfolio Taxation	632
7.1. Principles of Fixed-Income Taxation	633
7.2. Investment Vehicles and Taxes	634
8. Summary	636
References	637
Practice Problems	638
CHAPTER 13	
Liability-Driven and Index-Based Strategies	643
Learning Outcomes	643
1. Introduction	643
2. Liability-Driven Investing	644
3. Interest Rate Immunization—Managing the Interest Rate Risk of a Single Liability	648
4. Interest Rate Immunization—Managing the Interest Rate Risk of Multiple Liabilities	660
4.1. Cash Flow Matching	661
4.2. Duration Matching	664
4.3. Derivatives Overlay	670
4.4. Contingent Immunization	674
5. Liability-Driven Investing—An Example of a Defined Benefit Pension Plan	675
6. Risks in Liability-Driven Investing	685
7. Bond Indexes and the Challenges of Matching a Fixed-Income Portfolio to an Index	689

8. Alternative Methods for Establishing Passive Bond Market Exposure	695
9. Benchmark Selection	701
10. Laddered Bond Portfolios	704
11. Summary	708
References	711
Practice Problems	712
CHAPTER 14	
Yield Curve Strategies	721
Learning Outcomes	721
1. Introduction	721
2. Foundational Concepts for Active Management of Yield Curve Strategies	722
2.1. A Review of Yield Curve Dynamics	724
2.2. Duration and Convexity	727
3. Major Types of Yield Curve Strategies	729
3.1. Strategies under Assumptions of a Stable Yield Curve	730
3.2. Strategies for Changes in Market Level, Slope, or Curvature	737
4. Formulating a Portfolio Positioning Strategy Given a Market View	747
4.1. Duration Positioning in Anticipation of a Parallel Upward Shift in the Yield Curve	748
4.2. Portfolio Positioning in Anticipation of a Change in Interest Rates, Direction Uncertain	751
4.3. Performance of Duration-Neutral Bullets, Barbells, and Butterflies Given a Change in the Yield Curve	752
4.4. Using Options	765
5. Inter-Market Curve Strategies	770
6. Comparing the Performance of Various Duration-Neutral Portfolios in Multiple Curve Environments	784
6.1. The Baseline Portfolio	784
6.2. The Yield Curve Scenarios	785
6.3. Extreme Barbell vs. Laddered Portfolio	787
6.4. Extreme Bullet	788
6.5. A Less Extreme Barbell Portfolio vs. Laddered Portfolio	789
6.6. Comparing the Extreme and Less Extreme Barbell Portfolios	790
7. A Framework for Evaluating Yield Curve Trades	793
8. Summary	802
Practice Problems	804
CHAPTER 15	
Fixed-Income Active Management: Credit Strategies	817
Learning Outcomes	817
1. Introduction	817
2. Investment-Grade and High-Yield Corporate Bond Portfolios	818
2.1. Credit Risk	819
2.2. Credit Migration Risk and Spread Risk	820

2.3. Interest Rate Risk	821
2.4. Liquidity and Trading	824
3. Credit Spreads	826
3.1. Credit Spread Measures	826
3.2. Excess Return	831
4. Credit Strategy Approaches	832
4.1. The Bottom-Up Approach	832
4.2. The Top-Down Approach	842
4.3. Comparing the Bottom-Up and Top-Down Approaches	850
4.4. ESG Considerations in Credit Portfolio Management	851
5. Liquidity Risk and Tail Risk in Credit Portfolios	853
5.1. Liquidity Risk	853
5.2. Tail Risk	857
6. International Credit Portfolios	859
6.1. Relative Value in International Credit Portfolios	860
6.2. Emerging Markets Credit	861
6.3. Global Liquidity Considerations	862
6.4. Currency Risk in Global Credit Portfolios	862
6.5. Legal Risk	863
7. Structured Financial Instruments	863
7.1. Mortgage-Backed Securities	864
7.2. Asset-Backed Securities	865
7.3. Collateralized Debt Obligations	865
7.4. Covered Bonds	867
8. Summary	867
References	869
Practice Problems	869
Glossary	875
About the Editors	891
About the CFA Program	893
Index	895

PREFACE

We are pleased to bring you *Fixed Income Analysis*, which provides authoritative and up-to-date coverage of how investment professionals analyze and manage fixed-income portfolios. As with many of the other titles in the CFA Institute Investment Series, the content for this book is drawn from the official CFA Program curriculum. As such, readers can rely on the content of this book to be current, globally relevant, and practical.

The content was developed in partnership by a team of distinguished academics and practitioners, chosen for their acknowledged expertise in the field, and guided by CFA Institute. It is written specifically with the investment practitioner in mind and provides numerous examples and practice problems that reinforce the learning outcomes and demonstrate real-world applicability.

The CFA Program curriculum, from which the content of this book was drawn, is subjected to a rigorous review process to assure that it is:

- Faithful to the findings of our ongoing industry practice analysis
- Valuable to members, employers, and investors
- Globally relevant
- Generalist (as opposed to specialist) in nature
- Replete with sufficient examples and practice opportunities
- Pedagogically sound

The accompanying workbook is a useful reference that provides Learning Outcome Statements, which describe exactly what readers will learn and be able to demonstrate after mastering the accompanying material. Additionally, the workbook has summary overviews and practice problems for each chapter.

We hope you will find this and other books in the CFA Institute Investment Series helpful in your efforts to grow your investment knowledge, whether you are a relatively new entrant or an experienced veteran striving to keep up to date in the ever-changing market environment. CFA Institute, as a long-term committed participant in the investment profession and a not-for-profit global membership association, is pleased to provide you with this opportunity.

THE CFA PROGRAM

If the subject matter of this book interests you, and you are not already a CFA charterholder, we hope you will consider registering for the CFA Program and starting progress toward earning the Chartered Financial Analyst designation. The CFA designation is a globally recognized standard of excellence for measuring the competence and integrity of investment professionals. To earn the CFA charter, candidates must successfully complete the CFA Program, a global

graduate-level self-study program that combines a broad curriculum with professional conduct requirements as preparation for a career as an investment professional.

Anchored by a practice-based curriculum, the CFA Program Body of Knowledge reflects the knowledge, skills, and abilities identified by professionals as essential to the investment decision-making process. This body of knowledge maintains its relevance through a regular, extensive survey of practicing CFA charterholders across the globe. The curriculum covers 10 general topic areas, ranging from equity and fixed-income analysis to portfolio management to corporate finance—all with a heavy emphasis on the application of ethics in professional practice. Known for its rigor and breadth, the CFA Program curriculum highlights principles common to every market so that professionals who earn the CFA designation have a thoroughly global investment perspective and a profound understanding of the global marketplace.

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Special thanks to all the reviewers, curriculum advisors, and question writers who helped to ensure high practical relevance, technical correctness, and understandability of the material presented here.

Production

We would like to thank the many others who played a role in the conception and production of this book: the Curriculum and Learning Experience team at CFA Institute, with special thanks to the Curriculum Directors, past and present, who worked with the authors and reviewers to produce the chapters in this book; the Practice Analysis team at CFA Institute; and the Credentialing Product Marketing team at CFA Institute.

ABOUT THE CFA INSTITUTE SERIES

CFA Institute is pleased to provide you with the CFA Institute Investment Series, which covers major areas in the field of investments. We provide this series for the same reason we have been chartering investment professionals for more than 50 years: to lead the investment profession globally by promoting the highest standards of ethics, education, and professional excellence for the ultimate benefit of society.

The books in the CFA Institute Investment Series contain practical, globally relevant material. They are intended both for those contemplating entry into the extremely competitive field of investment management as well as for those seeking a means of keeping their knowledge fresh and up to date. This series was designed to be user friendly and highly relevant.

We hope you find this series helpful in your efforts to grow your investment knowledge, whether you are a relatively new entrant or an experienced veteran ethically bound to keep up to date in the ever-changing market environment. As a long-term, committed participant in the investment profession and a not-for-profit global membership association, CFA Institute is pleased to provide you with this opportunity.

THE TEXTS

Corporate Finance: A Practical Approach is a solid foundation for those looking to achieve lasting business growth. In today's competitive business environment, companies must find innovative ways to enable rapid and sustainable growth. This text equips readers with the foundational knowledge and tools for making smart business decisions and formulating strategies to maximize company value. It covers everything from managing relationships between stakeholders to evaluating merger and acquisition bids, as well as the companies behind them. Through extensive use of real-world examples, readers will gain critical perspective into interpreting corporate financial data, evaluating projects, and allocating funds in ways that increase corporate value. Readers will gain insights into the tools and strategies used in modern corporate financial management.

Equity Asset Valuation is a particularly cogent and important resource for anyone involved in estimating the value of securities and understanding security pricing. A well-informed professional knows that the common forms of equity valuation—dividend discount modeling, free cash flow modeling, price/earnings modeling, and residual income modeling—can all be reconciled with one another under certain assumptions. With a deep understanding of the underlying assumptions, the professional investor can better understand what other investors assume when calculating their valuation estimates. This text has a global orientation, including emerging markets.

International Financial Statement Analysis is designed to address the ever-increasing need for investment professionals and students to think about financial statement analysis from a global perspective. The text is a practically oriented introduction to financial statement analysis that is distinguished by its combination of a true international orientation, a structured presentation style, and abundant illustrations and tools covering concepts as they are introduced in the text. The authors cover this discipline comprehensively and with an eye to ensuring the reader's success at all levels in the complex world of financial statement analysis.

Investments: Principles of Portfolio and Equity Analysis provides an accessible yet rigorous introduction to portfolio and equity analysis. Portfolio planning and portfolio management are presented within a context of up-to-date, global coverage of security markets, trading, and market-related concepts and products. The essentials of equity analysis and valuation are explained in detail and profusely illustrated. The book includes coverage of practitioner-important but often neglected topics, such as industry analysis. Throughout, the focus is on the practical application of key concepts with examples drawn from both emerging and developed markets. Each chapter affords the reader many opportunities to self-check his or her understanding of topics.

One of the most prominent texts over the years in the investment management industry has been Maginn and Tuttle's *Managing Investment Portfolios: A Dynamic Process*. The third edition updates key concepts from the 1990 second edition. Some of the more experienced members of our community own the prior two editions and will add the third edition to their libraries. Not only does this seminal work take the concepts from the other readings and put them in a portfolio context, but it also updates the concepts of alternative investments, performance presentation standards, portfolio execution, and, very importantly, individual investor portfolio management. Focusing attention away from institutional portfolios and toward the individual investor makes this edition an important and timely work.

The New Wealth Management: The Financial Advisor's Guide to Managing and Investing Client Assets is an updated version of Harold Evensky's mainstay reference guide for wealth managers. Harold Evensky, Stephen Horan, and Thomas Robinson have updated the core text of the 1997 first edition and added an abundance of new material to fully reflect today's investment challenges. The text provides authoritative coverage across the full spectrum of wealth management and serves as a comprehensive guide for financial advisers. The book expertly blends investment theory and real-world applications and is written in the same thorough but highly accessible style as the first edition.

Quantitative Investment Analysis focuses on some key tools that are needed by today's professional investor. In addition to classic time value of money, discounted cash flow applications, and probability material, there are two aspects that can be of value over traditional thinking. The first involves the chapters dealing with correlation and regression that ultimately figure into the formation of hypotheses for purposes of testing. This gets to a critical skill that challenges many professionals: the ability to distinguish useful information from the overwhelming quantity of available data. Second, the final chapter of *Quantitative Investment Analysis* covers portfolio concepts and takes the reader beyond the traditional capital asset pricing model (CAPM) type of tools and into the more practical world of multifactor models and arbitrage pricing theory.

All books in the CFA Institute Investment Series are available through all major booksellers. All titles also are available on the Wiley Custom Select platform at <http://customselect.wiley.com>, where individual chapters for all the books may be mixed and matched to create custom textbooks for the classroom.

FIXED INCOME ANALYSIS

PART I

FIXED INCOME ESSENTIALS

FIXED-INCOME SECURITIES: DEFINING ELEMENTS

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LEARNING OUTCOMES

After completing this chapter, you will be able to do the following:

- describe basic features of a fixed-income security;
- describe content of a bond indenture;
- compare affirmative and negative covenants and identify examples of each;
- describe how legal, regulatory, and tax considerations affect the issuance and trading of fixed-income securities;
- describe how cash flows of fixed-income securities are structured;
- describe contingency provisions affecting the timing and/or nature of cash flows of fixed-income securities and identify whether such provisions benefit the borrower or the lender.

1. INTRODUCTION

Judged by total market value, fixed-income securities constitute the most prevalent means of raising capital globally. A fixed-income security is an instrument that allows governments, companies, and other types of issuers to borrow money from investors. Any borrowing of money is debt. The promised payments on fixed-income securities are, in general, contractual (legal) obligations of the issuer to the investor. For companies, fixed-income securities contrast to common shares in not having ownership rights. Payments of interest and repayment of principal (amount borrowed) are a prior claim on the company's earnings and assets compared with the claim of common shareholders. Thus, a company's fixed-income securities have, in theory, lower risk than that company's common shares.

In portfolio management, fixed-income securities fulfill several important roles. They are a prime means by which investors—individual and institutional—can prepare to fund,

with some degree of safety, known future obligations such as tuition payments or pension obligations. The correlations of fixed-income securities with common shares vary; but, adding fixed-income securities to portfolios including common shares is usually an effective way of obtaining diversification benefits.

Among the questions this chapter addresses are the following:

- What set of features defines a fixed-income security, and how do these features determine the scheduled cash flows?
- What are the legal, regulatory, and tax considerations associated with a fixed-income security, and why are these considerations important for investors?
- What are the common structures regarding the payment of interest and repayment of principal?
- What types of provisions may affect the disposal or redemption of fixed-income securities?

Embarking on the study of fixed-income securities, please note that the terms “fixed-income securities,” “debt securities,” and “bonds” are often used interchangeably by experts and non-experts alike. We will also follow this convention, and where any nuance of meaning is intended, it will be made clear.¹

The remainder of this chapter is organized as follows. Section 2 describes, in broad terms, what an investor needs to know when investing in fixed-income securities. Section 3 covers the nature of the contract between the issuer and the bondholders as well as the legal, regulatory, and tax framework within which this contract exists. Section 4 presents the principal and interest payment structures that characterize fixed-income securities. Section 5 discusses the contingency provisions that affect the timing and/or nature of a bond’s cash flows. The final section provides a conclusion and summary of the chapter.

2. OVERVIEW OF A FIXED-INCOME SECURITY

A **bond** is a contractual agreement between the issuer and the bondholders. There are three important elements that an investor needs to know about when investing in a bond:

- The bond’s features, including the issuer, maturity, par value, coupon rate and frequency, and currency denomination. These features determine the bond’s scheduled cash flows and, therefore, are key determinants of the investor’s expected and actual return.
- The legal, regulatory, and tax considerations that apply to the contractual agreement between the issuer and the bondholders.
- The contingency provisions that may affect the bond’s scheduled cash flows. These contingency provisions are options; they give the issuer or the bondholders certain rights affecting the bond’s disposal or redemption.

This section describes a bond’s basic features and introduces yield measures. The legal, regulatory, and tax considerations and contingency provisions are discussed in Sections 3 and 5, respectively.

¹Note that the term “fixed income” is not to be understood literally: Some fixed-income securities have interest payments that change over time. Some experts include preference shares as a type of fixed-income security, but none view them as a type of bond. Finally, in some contexts, bonds refer to the longer-maturity form of debt securities in contrast to money market securities.

2.1. Basic Features of a Bond

All bonds, whether they are “traditional” bonds or asset-backed securities, are characterized by the same basic features. **Asset-backed securities** (ABS) are created via a process called securitization, which involves moving assets from the owner of the assets into a special legal entity. This special legal entity then uses the securitized assets as guarantees to back (secure) a bond issue, leading to the creation of ABS. Assets that are typically used to create ABS include residential and commercial mortgage loans (mortgages), automobile (auto) loans, student loans, bank loans, and credit card debt, among others. Many elements discussed in this chapter apply to both traditional bonds and ABS. Considerations specific to ABS are discussed in the introduction to asset-backed securities chapter.

2.1.1. Issuer

Many entities issue bonds: private individuals, such as the musician David Bowie; national governments, such as Singapore or Italy; and companies, such as BP, General Electric, or Tata Group.

Bond issuers are classified into categories based on the similarities of these issuers and their characteristics. Major types of issuers include the following:

- Supranational organizations, such as the World Bank or the European Investment Bank;
- Sovereign (national) governments, such as the United States or Japan;
- Non-sovereign (local) governments, such as the state of Minnesota in the United States, the region of Catalonia in Spain, or the city of Edmonton in Canada;
- Quasi-government entities (i.e., agencies that are owned or sponsored by governments), such as postal services in many countries—for example, Correios in Brazil, La Poste in France, or Pos in Indonesia;
- Companies (i.e., corporate issuers). A distinction is often made between financial issuers (e.g., banks and insurance companies) and non-financial issuers; and
- Special legal entities that securitize assets to create ABS that are then sold to investors.

Market participants often classify fixed-income markets by the type of issuer, which leads to the identification of three bond market sectors: the government and government-related sector (i.e., the first four types of issuers listed above), the corporate sector (the fifth type listed above), and the structured finance sector (the last type listed above).

Bondholders are exposed to credit risk—that is, the risk of loss resulting from the issuer failing to make full and timely payments of interest and/or repayments of principal. Credit risk is inherent to all debt investments. Bond markets are sometimes classified into sectors based on the issuer’s creditworthiness as judged by credit rating agencies. One major distinction is between investment-grade and non-investment-grade bonds, also called high-yield or speculative bonds.² Although a variety of considerations enter into distinguishing the two sectors, the promised payments of investment-grade bonds are perceived as less risky than those of non-investment-grade bonds because of profitability and liquidity considerations. Some regulated financial intermediaries, such as banks and life insurance companies, may face explicit or implicit limitations of holdings of non-investment-grade bonds. The investment policy statements of some investors may also include constraints or limits on such holdings. From

²The three largest credit rating agencies are Moody’s Investors Service, Standard & Poor’s, and Fitch Ratings. Bonds rated Baa3 or higher by Moody’s and BBB– or higher by Standard & Poor’s and Fitch are considered investment grade.

the issuer's perspective, an investment-grade credit rating generally allows easier access to bond markets and at lower interest rates than does a non-investment-grade credit rating.³

2.1.2. Maturity

The maturity date of a bond refers to the date when the issuer is obligated to redeem the bond by paying the outstanding principal amount. The **tenor** is the time remaining until the bond's maturity date. The tenor is an important consideration in the analysis of a bond. It indicates the period over which the bondholder can expect to receive the interest payments and the length of time until the principal is repaid in full.

Maturities typically range from overnight to 30 years or longer. Fixed-income securities with maturities at issuance (original maturity) of one year or less are known as **money market securities**. Issuers of money market securities include governments and companies. Commercial paper and certificates of deposit are examples of money market securities. Fixed-income securities with original maturities that are longer than one year are called **capital market securities**. Although very rare, **perpetual bonds**, such as the consols issued by the sovereign government in the United Kingdom, have no stated maturity date.

2.1.3. Par Value

The **principal amount**, **principal value**, or simply **principal** of a bond is the amount that the issuer agrees to repay the bondholders on the maturity date. This amount is also referred to as the par value, or simply par, face value, nominal value, redemption value, or maturity value. Bonds can have any par value.

In practice, bond prices are quoted as a percentage of their par value. For example, assume that a bond's par value is \$1,000. A quote of 95 means that the bond's price is \$950 ($95\% \times \$1,000$). When the bond is priced at 100% of par, the bond is said to be trading at par. If the bond's price is below 100% of par, such as in the previous example, the bond is trading at a discount. Alternatively, if the bond's price is above 100% of par, the bond is trading at a premium.

2.1.4. Coupon Rate and Frequency

The coupon rate or nominal rate of a bond is the interest rate that the issuer agrees to pay each year until the maturity date. The annual amount of interest payments made is called the coupon. A bond's coupon is determined by multiplying its coupon rate by its par value. For example, a bond with a coupon rate of 6% and a par value of \$1,000 will pay annual interest of \$60 ($6\% \times \$1,000$).

Coupon payments may be made annually, such as those for German government bonds or Bunds. Many bonds, such as government and corporate bonds issued in the United States or government gilts issued in the United Kingdom, pay interest semi-annually. Some bonds make quarterly or monthly interest payments. The acronyms QUIBS (quarterly interest bonds) and QUIDS (quarterly income debt securities) are used by Morgan Stanley and Goldman Sachs, respectively, for bonds that make quarterly interest payments. Many **mortgage-backed securities** (MBS), which are ABS backed by residential or commercial mortgages, pay interest monthly to match the cash flows of the mortgages backing these MBS. If a bond has a coupon rate of 6% and a par value of \$1,000, the periodic interest payments will be \$60 if coupon payments are made annually, \$30 if they are made semi-annually, \$15 if they are made quarterly, and \$5 if they are made monthly.

A **plain vanilla bond** or **conventional bond** pays a fixed rate of interest. In this case, the coupon payment does not change during the bond's life. However, there are bonds that pay

³Several other distinctions among credit ratings are made. They are discussed in depth in Chapter 6, "Fundamentals of Credit Analysis."