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CFA INSTITUTE INVESTMENT SERIES

Fourth Edition

Fixed Income Analysis

WILEY

FIXED INCOME ANALYSIS

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FIXED INCOME ANALYSIS

Fourth Edition

James F. Adams, PhD, CFA

Donald J. Smith, PhD

WILEY

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CONTENTS

PART II
Fixed Income Term Structure, Advanced Valuation and Credit Analysis

CHAPTER 7
The Term Structure and Interest Rate Dynamics 335

CHAPTER 8
The Arbitrage-Free Valuation Framework 397

CHAPTER 12
Overview of Fixed-Income Portfolio Management 605

CHAPTER 13
Liability-Driven and Index-Based Strategies 643

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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Authors
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Leslie Abreo, MFE
James F. Adams, PhD, CFA
Don M. Chance, PhD, CFA
Moorad Choudhry, PhD, FRM, FCSI
Frank J. Fabozzi, PhD, CPA, CFA
Ioannis Georgiou, CFA
Campe Goodman, CFA
Christopher L. Gootkind, CFA
Bernd Hanke, PhD, CFA
Brian J. Henderson, PhD, CFA
Thomas S.Y. Ho, PhD
Andrew Kalotay, PhD
Robert W. Kopprasch, PhD, CFA
Sang Bin Lee, PhD
Steven V. Mann, PhD
Oleg Melentyev, CFA
Brian Rose
Donald J. Smith, PhD
Lavone F. Whitmer, CFA
Stephen E. Wilcox, PhD, CFA

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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

CHAPTER 1

FIXED-INCOME SECURITIES: DEFINING ELEMENTS

Moorad Choudhry, PhD, FRM, FCSI
Stephen E. Wilcox, PhD, CFA

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.

[1] Note 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

[2]The 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% × $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% × $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

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