2025 CFA®
Exam Prep

SchweserNotes™
Fixed Income and Derivatives

Level I Book 3

KAPLAN SCHWESER

Book 3: Fixed Income and Derivatives

SchweserNotes™ 2025

Level I CFA®

SCHWESERNOTES™ 2025 LEVEL I CFA® BOOK 3: FIXED INCOME AND DERIVATIVES

Published in 2024 by Kaplan, Inc.

ISBN: 978-1-0788-4564-9

CONTENTS

Learning Outcome Statements (LOS)

47. Fixed-Income Instrument Features

The candidate should be able to:

a. describe the features of a fixed-income security.
b. describe the contents of a bond indenture and contrast affirmative and negative covenants.

48. Fixed-Income Cash Flows and Types

The candidate should be able to:

a. describe common cash flow structures of fixed-income instruments and contrast cash flow contingency provisions that benefit issuers and investors.
b. describe how legal, regulatory, and tax considerations affect the issuance and trading of fixed-income securities.

49. Fixed-Income Issuance and Trading

The candidate should be able to:

a. describe fixed-income market segments and their issuer and investor participants.
b. describe types of fixed-income indexes.
c. compare primary and secondary fixed-income markets to equity markets.

50. Fixed-Income Markets for Corporate Issuers

The candidate should be able to:

a. compare short-term funding alternatives available to corporations and financial institutions.
b. describe repurchase agreements (repos), their uses, and their benefits and risks.
c. contrast the long-term funding of investment-grade versus high-yield corporate issuers.

51. Fixed-Income Markets for Government Issuers

The candidate should be able to:

a. describe funding choices by sovereign and non-sovereign governments, quasi-government entities, and supranational agencies.
b. contrast the issuance and trading of government and corporate fixed-income instruments.

52. Fixed-Income Bond Valuation: Prices and Yields

The candidate should be able to:

a. calculate a bond's price given a yield-to-maturity on or between coupon dates.
b. identify the relationships among a bond's price, coupon rate, maturity, and yield-to-maturity.
c. describe matrix pricing.

53. Yield and Yield Spread Measures for Fixed-Rate Bonds

The candidate should be able to:

a. calculate annual yield on a bond for varying compounding periods in a year.
b. compare, calculate, and interpret yield and yield spread measures for fixed-rate bonds.

54. Yield and Yield Spread Measures for Floating-Rate Instruments

The candidate should be able to:

a. calculate and interpret yield spread measures for floating-rate instruments.
b. calculate and interpret yield measures for money market instruments.

55. The Term Structure of Interest Rates: Spot, Par, and Forward Curves

The candidate should be able to:

a. define spot rates and the spot curve, and calculate the price of a bond using spot rates.
b. define par and forward rates, and calculate par rates, forward rates from spot rates, spot rates from forward rates, and the price of a bond using forward rates.
c. compare the spot curve, par curve, and forward curve.

56. Interest Rate Risk and Return

The candidate should be able to:

a. calculate and interpret the sources of return from investing in a fixed-rate bond.
b. describe the relationships among a bond's holding period return, its Macaulay duration, and the investment horizon.
c. define, calculate, and interpret Macaulay duration.

57. Yield-Based Bond Duration Measures and Properties

The candidate should be able to:

a. define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).
b. explain how a bond's maturity, coupon, and yield level affect its interest rate risk.

58. Yield-Based Bond Convexity and Portfolio Properties

The candidate should be able to:

a. calculate and interpret convexity and describe the convexity adjustment.
b. calculate the percentage price change of a bond for a specified change in yield, given the bond's duration and convexity.
c. calculate portfolio duration and convexity and explain the limitations of these measures.

59. Curve-Based and Empirical Fixed-Income Risk Measures

The candidate should be able to:

a. explain why effective duration and effective convexity are the most appropriate measures of interest rate risk for bonds with embedded options.
b. calculate the percentage price change of a bond for a specified change in benchmark yield, given the bond's effective duration and convexity.
c. define key rate duration and describe its use to measure price sensitivity of fixed-income instruments to benchmark yield curve changes.
d. describe the difference between empirical duration and analytical duration.

60. Credit Risk

The candidate should be able to:

a. describe credit risk and its components, probability of default and loss given default.
b. describe the uses of ratings from credit rating agencies and their limitations.
c. describe macroeconomic, market, and issuer-specific factors that influence the level and volatility of yield spreads.

61. Credit Analysis for Government Issuers

The candidate should be able to:

a. explain special considerations when evaluating the credit of sovereign and non-sovereign government debt issuers and issues.

62. Credit Analysis for Corporate Issuers

The candidate should be able to:

a. describe the qualitative and quantitative factors used to evaluate a corporate borrower's creditworthiness.
b. calculate and interpret financial ratios used in credit analysis.
c. describe the seniority rankings of debt, secured versus unsecured debt and the priority of claims in bankruptcy, and their impact on credit ratings.

63. Fixed-Income Securitization

The candidate should be able to:

a. explain benefits of securitization for issuers, investors, economies, and financial markets.
b. describe securitization, including the parties and the roles they play.

64. Asset-Backed Security (ABS) Instrument and Market Features

The candidate should be able to:

a. describe characteristics and risks of covered bonds and how they differ from other asset-backed securities.
b. describe typical credit enhancement structures used in securitizations.
c. describe types and characteristics of non-mortgage asset-backed securities, including the cash flows and risks of each type.
d. describe collateralized debt obligations, including their cash flows and risks.

65. Mortgage-Backed Security (MBS) Instrument and Market Features

The candidate should be able to:

a. define prepayment risk and describe time tranching structures in securitizations and their purpose.
b. describe fundamental features of residential mortgage loans that are securitized.
c. describe types and characteristics of residential mortgage-backed securities, including mortgage pass-through securities and collateralized mortgage obligations, and explain the cash flows and risks for each type.
d. describe characteristics and risks of commercial mortgage-backed securities.

66. Derivative Instrument and Derivative Market Features

The candidate should be able to:

a. define a derivative and describe basic features of a derivative instrument.
b. describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

67. Forward Commitment and Contingent Claim Features and Instruments

The candidate should be able to:

a. define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.
b. determine the value at expiration and profit from a long or a short position in a call or put option.
c. contrast forward commitments with contingent claims.

68. Derivative Benefits, Risks, and Issuer and Investor Uses

The candidate should be able to:

a. describe benefits and risks of derivative instruments.
b. compare the use of derivatives among issuers and investors.

69. Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives

The candidate should be able to:

a. explain how the concepts of arbitrage and replication are used in pricing derivatives.
b. explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

70. Pricing and Valuation of Forward Contracts and for an Underlying with Varying Maturities

The candidate should be able to:

a. explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.
b. explain how forward rates are determined for interest rate forward contracts and describe the uses of these forward rates.

71. Pricing and Valuation of Futures Contracts

The candidate should be able to:

a. compare the value and price of forward and futures contracts.
b. explain why forward and futures prices differ.

72. Pricing and Valuation of Interest Rates and Other Swaps

The candidate should be able to:

a. describe how swap contracts are similar to but different from a series of forward contracts.
b. contrast the value and price of swaps.

73. Pricing and Valuation of Options

The candidate should be able to:

a. explain the exercise value, moneyness, and time value of an option.
b. contrast the use of arbitrage and replication concepts in pricing forward commitments and contingent claims.
c. identify the factors that determine the value of an option and describe how each factor affects the value of an option.

74. Option Replication Using Put–Call Parity

The candidate should be able to:

a. explain put–call parity for European options.
b. explain put–call *forward* parity for European options.

75. Valuing a Derivative Using a One-Period Binomial Model

The candidate should be able to:

a. explain how to value a derivative using a one-period binomial model.
b. describe the concept of risk neutrality in derivatives pricing.

READING 47

FIXED-INCOME INSTRUMENT FEATURES

MODULE 47.1: FIXED-INCOME INSTRUMENT FEATURES

Video covering this content is available online.

LOS 47.a: Describe the features of a fixed-income security.

Major types of fixed-income instruments include **loans**, which are private (nontradable) agreements between a borrower and lender, and **bonds** (or **fixed-income securities**), which are standardized, tradable securities representing a debt investment.

Investors in bonds are lending capital (referred to as **principal**, **par**, or **face value**) to the issuer of the bond. The issuer of the bond promises to repay this principal amount plus interest, typically in the form of a regular periodic **coupon** that is stated as a percentage of par. The capital raised is usually used to finance the long-term investments of the bond issuer. For a corporate issuer, loans and bonds are classified as long-term liabilities in the balance sheet.

Key features that are specified in a fixed-income security include the following:

- *Issuer*. Major issuers of bonds are sovereign national governments and corporations. Other issuers include local governments, supranational entities (e.g., the International Monetary Fund), quasi-government entities sponsored by the government (e.g., national railways), and special purpose entities, which are corporations set up to purchase financial assets and issue **asset-backed securities**, which are bonds backed by the cash flows from those assets.
- *Maturity*. The maturity date of a bond is the date on which the final cash flow is to be paid. Once a bond has been issued, the time remaining until maturity is referred to as the **tenor** of a bond. Bonds with original maturities (their tenor when they were first issued) of one year or less are referred to as **money market securities**. Bonds with original maturities of more than one year are referred to as **capital market securities**. Bonds that have no stated maturity date are called **perpetual bonds**.
- *Principal* (par or face value). The par value of a bond is the principal amount that will be repaid. Repayment of principal typically occurs at maturity, but debt instruments may specify that principal is paid back gradually over the life of the instrument, such as with a mortgage loan.

- *Coupon rate and frequency*. The coupon rate on a bond is the annual percentage of its par value that will be paid to bondholders. Some bonds make coupon interest payments annually, while others make semiannual, quarterly, or monthly payments. A $1,000 par value semiannual-pay bond with a fixed 5% coupon would pay 2.5% of $1,000, or $25, every six months.
  - Some bonds pay coupons based on a variable market rate of interest at the date of coupon payment. These bonds are called **floating-rate notes (FRNs)** or floaters. The variable market rate of interest is called the **market reference rate (MRR)**, and an FRN promises to pay the variable reference rate plus a fixed margin. This added margin is typically expressed in **basis points**, which are hundredths of 1%.
  - Some bonds pay no interest before maturity and are called **zero-coupon bonds** or **pure discount bonds**. *Pure discount* refers to the fact that these bonds are sold at a discount to their par value, and the interest is all paid at maturity when bondholders receive the par value. A 10-year, $1,000, zero-coupon bond yielding 7% would sell for a bit more than $500 initially and pay $1,000 at maturity. (In our reading on Fixed-Income Bond Valuation we will show how to calculate the exact price.)
- *Seniority*. In the event of bankruptcy or liquidation of an issuer, debt investors' claims on the issuer's assets rank above those of equity investors, making debt *senior* to equity in the capital structure of the issuer. However, not all debt claims rank equally. **Senior debt** ranks higher than **junior debt** (also called **subordinated debt**), making senior debt a less risky investment from a credit risk perspective.
- *Contingency provisions*. A bond may have an **embedded option**, such as a call option, put option, or the right to convert the debt into equity. We will describe these options in later readings.

Yield Measures

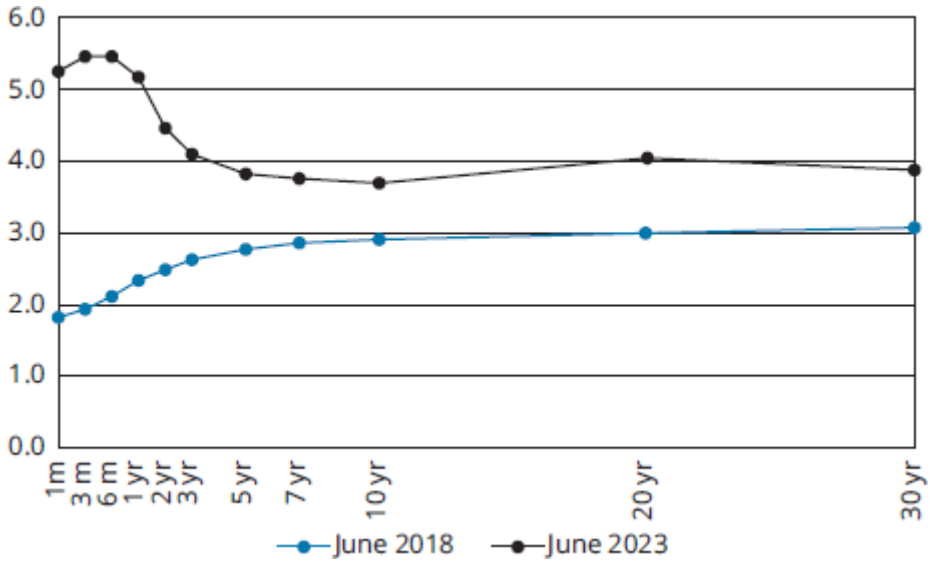
Given a bond's price and its expected cash flows, we can calculate the expected return from investing in the bond, referred to as the bond's **yield**. For a fixed-coupon bond, when prices fall, the bond offers a higher yield, and when prices rise, the bond offers a lower yield. As such, prices and yields are inversely related. We will perform yield calculations in later readings.

PROFESSOR'S NOTE

The inverse price/yield relationship for fixed-coupon bonds is a crucial concept that runs through the whole fixed income topic. If a bond with fixed cash flows is to offer a higher return (yield), the only way this is possible is through investors paying a lower price for the bond today. Hence, increasing bond yields imply decreasing bond prices, and decreasing bond yields imply increasing bond prices.

For a given issuer, we will likely find that bonds of different maturity will offer different yields. A graphical plot of these yields versus maturity is referred to as a **yield curve**. An example of yield curves for U.S. Treasury bonds is displayed in Figure 47.1.

Figure 47.1: U.S. Treasury Yield Curve



An upward-sloping yield curve (i.e., higher expected returns for longer-dated maturities), as U.S Treasuries exhibited in mid-2018, is referred to as a normal yield curve because this is the shape most frequently observed. A normal yield curve reflects investor demand for higher returns for longer-dated maturities due to higher levels of uncertainty (i.e., risk) over longer time frames. A downward-sloping yield curve, as U.S. Treasuries exhibited in mid-2023, is less common and is referred to as an **inverted yield curve**.

Government bonds are often deemed to be of the lowest credit risk (highest credit quality) in a particular market due to the fact the bonds are backed by the tax-raising powers of the government. A government bond yield curve is commonly used as a benchmark to assess the extra returns (called spreads) offered by more risky issuers, such as corporations. For example, if a 5-year corporate bond were yielding 6% and 5-year government bonds were yielding 5%, then the spread offered by the corporate bond is 6% − 5% = 1%. We will discuss credit spreads in more detail in later readings.

LOS 47.b: Describe the contents of a bond indenture and contrast affirmative and negative covenants.

The legal contract between the bond issuer (borrower) and bondholders (lenders) is called the **bond indenture**. The indenture defines obligations of, and restrictions on, the borrower, including the sources of repayment, and it forms the basis for all future interactions between the bondholder and the issuer.

Sources of Repayment

The source of the cash flows required to be paid by the bond issuer depends on the nature of the issuer and type of bond issue.

Sovereign (national government) bonds are repaid from taxes on economic activity and, in some cases, the ability of a government to create new currency. This tends to result in sovereign debt being perceived as the lowest credit risk in a particular region.

Local government bonds are repaid from local government taxes or revenue from operational infrastructure, such as toll roads.

The sources of repayment for a corporate bond depend on the type of bond issue. A **secured bond** is repaid from the operating cash flow of the company, with the added security of a legal claim (called a **lien** or **pledge**) on specific assets of the company (referred to as **collateral**) in the event of issuer default. This contrasts with an **unsecured bond**, which, having no such claim, is repaid only from the operating cash flow of the issuing company.

For an asset-backed security (ABS), financial assets held by the special purpose entity that has issued the ABS provide the cash flows promised to the ABS investors. We will discuss these in more detail in later readings.

Bond Covenants

While debt investments do not provide voting rights in the same way as an equity investment, certain legal rules known as **covenants** can be written into the bond indenture.

Affirmative covenants specify requirements the issuer must fulfill. These may require the issuer to provide timely financial reports to bondholders, specify the use of proceeds from the bond issue, or specify a bondholder's right to redeem at a premium to par if the issuer is acquired in a merger or corporate takeover.

Two examples of affirmative covenants are **cross-default** and **pari passu** provisions. A cross-default clause states that if the issuer defaults on any other debt obligation, the issuer will also be considered in default on this bond. A pari passu clause states that the bond will have the same priority of claims as the issuer's other senior debt issues.

Negative covenants place restrictions on the issuer. These can include restrictions on:

- entering into asset sales and leaseback agreements;
- pledges of collateral (the company cannot use the same assets to back several debt issues simultaneously);
- issuance of debt that ranks more senior than existing debt (referred to as a **negative pledge clause**); and
- additional borrowings, share repurchases, or dividend payments. These actions can be subject to an **incurrence test** relating to the financial ratios of the company—for example, they can only be carried out if debt/EBITDA is below a specified threshold.

Negative covenants protect the interests of bondholders and prevent the issuing firm from taking actions that would increase the risk of default. However, covenants must not be so restrictive that they prevent the firm from taking advantage of opportunities or responding appropriately to changing business circumstances.

MODULE QUIZ 47.1

1. A fixed-coupon bond will pay a coupon equal to its:
   A. yield multiplied by price.
   B. stated coupon rate multiplied by price.

C. stated coupon rate multiplied by face value.

2. When fixed-coupon bond prices fall:

A. their yields rise.
B. their yields fall.
C. their coupon rates fall.

3. A bond's indenture:

A. contains its covenants.
B. is only required in the event of a lien on collateral.
C. relates only to its interest and principal payments.

4. A clause in a bond indenture that requires the borrower to perform a certain action is *most accurately* described as a(n):

A. trust deed.
B. negative covenant.
C. affirmative covenant.

KEY CONCEPTS

LOS 47.a

Basic features of a fixed income security include the issuer, maturity date, par value, coupon rate, coupon frequency, seniority, and contingency provisions.

- Issuers include corporations, governments, quasi-government entities, supranational entities and special purpose entities set up to issue asset-backed securities.
- Bonds with original maturities of one year or less are money market securities. Bonds with original maturities of more than one year are capital market securities. Bonds with no stated maturity are perpetual bonds.
- Par value is the principal amount that will be repaid to bondholders, usually at maturity.
- Coupon rate is the percentage of par value that is paid annually as interest. Coupon frequency may be annual, semiannual, quarterly, or monthly. Zero-coupon bonds pay no coupon interest and are pure discount securities.
- Senior debt ranks above junior (subordinated) debt should an issuer file for bankruptcy or undergo liquidation. Junior bonds with lower credit quality must offer investors higher yields to compensate for the greater probability of default.
- Contingency provisions are rights to take actions in response to some potential future event, such as the right for the issuer to call the bond back earlier than maturity.

The return earned from investing in a bond is referred to as the bond's yield. For a fixed coupon bond, there is an inverse relationship between the price and the yield (return) of the instrument. A plot of yield versus maturity for a certain issuer or class of bond is referred to as a yield curve.

The source of repayment for sovereign bonds is the country's taxing authority. For non-sovereign government bonds, the sources may be taxing authority or revenues from a

project. Corporate bonds are repaid with funds from the firm's operations. Securitized bonds are repaid with cash flows from a pool of financial assets.

Bonds are secured if they are backed by specific collateral or unsecured if they represent an overall claim against the issuer's cash flows and assets.

LOS 47.b

A bond indenture is a contract between a bond issuer and the bondholders which defines the bond's features and the issuer's obligations. An indenture specifies the entity issuing the bond, the source of funds for repayment, assets pledged as collateral, credit enhancements, and any covenants with which the issuer must comply. Affirmative covenants specify actions an issuer must take, negative covenants specify restrictions on the issuer.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 47.1

1. **C** A fixed-coupon bond has a stated coupon rate that is applied to the bond's face (principal or par) value. The yield of the bond is the return earned through paying the bond's price today and holding the bond to maturity. (LOS 47.a)

2. **A** For fixed-coupon bonds, prices and yields have an inverse relationship. If the price of the bond is falling, then the return (yield) from buying the bond at the lower price is rising. (LOS 47.a)

3. **A** An indenture is the contract between the company and its bondholders and contains the bond's covenants. (LOS 47.b)

4. **C** Affirmative covenants require the borrower to perform certain actions. Negative covenants restrict the borrower from performing certain actions. Trust deed is another name for a bond indenture. (LOS 47.b)

READING 48

FIXED-INCOME CASH FLOWS AND TYPES

MODULE 48.1: FIXED-INCOME CASH FLOWS AND TYPES

Video covering this content is available online.

LOS 48.a: Describe common cash flow structures of fixed-income instruments and contrast cash flow contingency provisions that benefit issuers and investors.

A typical bond has a **bullet structure**, where principal (par value) is paid back in a single payment at maturity. Periodic payments across the life of the bond (referred to as the bond's **coupons**) are purely interest payments.

Consider a $1,000 par value 5-year bond with an annual coupon rate of 5%, issued at par. With a bullet structure, the bond's promised payments at the end of each year would be as follows.

Year	1	2	3	4	5
PMT	$50	$50	$50	$50	$1,050
Principal remaining	$1,000	$1,000	$1,000	$1,000	$0

A loan structure in which the periodic payments include both interest and some repayment of principal (the amount borrowed) is called an **amortizing loan**. If a bond (loan) is **fully amortizing**, this means the principal is fully paid off when the last periodic payment is made. Typically, automobile loans and home loans are fully amortizing loans. If the 5-year, 5% bond in the previous table had a fully amortizing structure rather than a bullet structure, the payments and remaining principal balance at each year-end would be as follows (final payment reflects rounding of previous payments).

Year	1	2	3	4	5
PMT	$230.97	$230.97	$230.97	$230.97	$230.98
Principal remaining	$819.03	$629.01	$429.49	$219.99	$0

This constant PMT can be calculated using a financial calculator:

N = 5; I/Y = 5; PV = 1,000; FV = 0; CPT → PMT = −230.97

Note that the constant yearly payment of $230.97, here, is partly interest and partly principal loan repayment. For example, in the first year, the interest component is 0.05 × $1,000 = $50; hence, the principal component is $230.97 − $50 = $180.97. The opening principal balance for the second year is, therefore, $1,000 − $180.97 = $819.03. In subsequent years, the interest component of the $230.97 will decrease and the proportion relating to principal repayment will increase.

A bond can also be structured to be **partially amortizing** so that there is a repayment of some principal at maturity (referred to as a **balloon payment**). Unlike a bullet structure, the final payment includes just the remaining unamortized principal amount rather than the full principal amount. In the following table, the final payment includes $200 to repay the remaining principal outstanding.

Year	1	2	3	4	5
PMT	$194.78	$194.78	$194.78	$194.78	$394.78
Principal remaining	$855.22	$703.20	$543.58	$375.98	$0

This constant PMT can be calculated using a financial calculator:

N = 5; I/Y = 5; PV = 1,000; ***FV*** = ***−200***; CPT → PMT = −194.78

Other types of amortization schedules include **sinking fund provisions** for bonds and **waterfall structures** for asset-backed securities (ABSs) and mortgage-backed securities (MBSs).

Sinking fund provisions provide for the repayment of principal through a series of payments over the life of a bond issue. For example, a 20-year issue with a face amount of $300 million may require that the bond trustee redeems $20 million of the principal from investors selected at random every year beginning in the sixth year.

Sinking fund provisions offer both advantages and disadvantages to bondholders. On the plus side, bonds with a sinking fund provision have less credit risk because the periodic redemptions reduce the total amount of principal to be repaid at maturity. The presence of a sinking fund, however, can be a disadvantage to bondholders when interest rates fall due to **reinvestment risk**, which is the possibility of receiving cash flows early and only being able to reinvest them at lower yields.

Waterfall structures are used to establish principal repayments to holders of ABSs and MBSs. These structured products can be split into *tranches* of varying seniority. A common waterfall structure is for junior tranches not to receive any principal payment from the collateral pool until all senior tranches have been fully repaid. Interest payments would still be made to all tranches.

There are several coupon structures besides a fixed-coupon structure. We summarize the most important ones here.

Variable Interest Debt

Some bonds pay periodic interest that depends on the prevailing market rate of interest at the time future coupon payments are made. These bonds are called **floating-rate notes (FRNs)** or **floaters**. The variable market rate of interest is called the **market**

reference rate (MRR), and an FRN promises to pay the MRR plus some fixed margin (called a **credit spread**). This added margin is typically expressed in **basis points**, which are hundredths of 1%. A 120 basis point margin is equivalent to 1.2%.

Most floaters pay quarterly coupons and are based on a quarterly (90-day) reference rate. As an example, consider an FRN that pays a quarterly interest rate of MRR plus 0.75% (75 basis points). If the annualized MRR in the current quarter is 2.3%, the bond will pay (2.3% + 0.75%)/4 = 0.7625% of its par value at the end of the quarter.

Other Coupon Structures

Step-up coupon bonds are structured so that the coupon rate increases over time according to a predetermined schedule, providing protection to investors against interest rates rising over the life of the bond.

Coupon changes could also be linked to future potential events. For example, loans to borrowers of lower credit quality (called **leveraged loans**) often have a coupon that increases if the credit quality of the issuer decreases further. For example, the term sheet of a leveraged loan might specify that the coupon to be paid is MRR + 2.5%; however, should the issuer's debt/EBITDA ratio rise above 3, then the coupon paid will increase to MRR + 3%. A similar provision is often included in a **credit-linked note**, whereby the coupon rate increases if the credit rating of the issuer deteriorates (or decreases if the credit rating improves).

A **payment-in-kind (PIK) bond** allows the issuer to make the coupon payments by increasing the principal amount of the outstanding bonds, essentially paying bond interest with more bonds. Firms that issue PIK bonds typically do so because they anticipate that firm cash flows may be less than required to service the debt, often because of high levels of debt financing (leverage). These bonds typically have higher yields because of the lower perceived credit quality implied by expected cash flow shortfalls, or simply because of the high leverage of the issuing firm.

More recently, **green bonds** have been issued whereby the coupon paid increases if certain environmental goals (for example CO_2 emissions reduction) are not met by the issuer over a specified time frame.

An **index-linked bond** has coupon payments or a principal value that is based on a specified published index. **Inflation-linked bonds** (also called **linkers**) are the most common type of index-linked bonds, which increase their cash flows in line with a specified inflation index, such as the Consumer Price Index (CPI) in the United States, to protect the real value of the cash flows promised to investors.

The different structures of inflation-indexed bonds include the following:

- **Interest-indexed bonds.** The coupon rate is adjusted for inflation, while the principal value remains unchanged. This means the principal value of the debt is not inflation-protected.
- **Capital-indexed bonds.** This is the most common structure. An example is U.S. **Treasury Inflation-Protected Securities (TIPS)**. The coupon rate remains constant, but the principal value is increased by the rate of inflation, or decreased by deflation.

In the case of deflation, TIPS investors receive the maximum of inflation-adjusted principal or the unindexed par amount at maturity.

To better understand the structure of capital-indexed bonds, consider a bond with a par value of $1,000 at issuance, a 3% annual coupon rate paid semiannually, and a provision that the principal value will be adjusted for inflation (or deflation). If, six months after issuance, the reported inflation has been 1% over the period, the principal value of the bonds is increased by 1% from $1,000 to $1,010, and the six-month coupon is calculated as 1.5% of the adjusted principal value of $1,010 (i.e., $1,010 × 1.5% = $15.15).

With this structure, we can view the coupon rate of 3% as a real rate of interest. Unexpected inflation will not decrease the purchasing power of the coupon interest payments, and the principal value paid at maturity will have approximately the same purchasing power as the $1,000 par value did at bond issuance. Thus, investors are fully protected against inflation over the life of the bond.

Zero-coupon bonds are the simplest form of fixed-income instrument, offering only a single payment of par at maturity. These bonds are popular with investors that wish to minimize reinvestment risk. With no periodic coupon, zero-coupon bonds must trade below par to offer investors a positive return.

With a **deferred coupon bond**, regular coupon payments do not begin until a specified time after issuance. These bonds may be appropriate financing for issuers with a low credit rating or with a large project that will not be completed and generating revenue for some period after bond issuance. Zero-coupon bonds can be considered the most extreme type of deferred coupon bond—and, like zero-coupon bonds, deferred coupon bonds often trade below par to provide investors with the yields they demand.

Fixed-Income Contingency Provisions

A **contingency provision** in a contract describes an action that may be taken if an event (the contingency) actually occurs. Contingency provisions in bond indentures are referred to as **embedded options**—embedded in the sense that they are an integral part of the bond contract and are not a separate security. Some embedded options are exercisable at the option of the issuer of the bond, so they are valuable to the issuer; others are exercisable at the option of the purchaser of the bond, so they have value to the bondholder.

We will discuss three types of bonds with embedded options here: callable bonds, putable bonds, and convertible bonds. Bonds that do not have contingency provisions are referred to as *straight bonds* or *option-free* bonds.

Callable Bonds

A **callable bond** gives the *issuer* the right, but not the obligation, to redeem (through buying bonds back from investors before maturity) all or part of a bond issue at a predetermined fixed price (known as a call price).

As an example of a call provision, consider a 6% 20-year bond issued at par on June 1, 2022, for which the indenture includes the following *call schedule*:

- The bonds can be redeemed by the issuer at 102% of par after June 1, 2027.
- The bonds can be redeemed by the issuer at 101% of par after June 1, 2030.
- The bonds can be redeemed by the issuer at 100% of par after June 1, 2032.

For the 5-year period from the issue date until June 2027, the bond is not callable; hence, we say the bond has five years of **call protection**.

June 1, 2027, is referred to as the *first call date* (the start of the **call period** where the bond can be called by the issuer) and the *call price* is 102 (102% of par value) between that date and June 2030. The call price declines to 101 (101% of par) after June 1, 2030. After, June 1, 2032, the bond is callable at par.

A call option has value to the issuer because it gives the issuer the right to redeem the bond early and issue a new bond (borrow) if the market yield on the bond declines. This could occur either because interest rates in general have decreased, or because the credit quality of the bond has increased (default risk has decreased).

Consider a situation where the market yield on the 6% 20-year bond has declined from 6% at issuance to 4% on June 1, 2027 (the first call date). If the bond did not have a call option, it would trade at approximately $1,224. With a call price of 102, the issuer can redeem the bonds at $1,020 each and borrow that amount at the current market yield of 4%, reducing the annual interest payment from $60 per bond to $40.80.

PROFESSOR'S NOTE
This is analogous to refinancing a home mortgage when mortgage rates fall to reduce the monthly payments.

The issuer holding the call option creates **call risk** for the bondholder. Call risk relates to the fact that bondholders face an uncertain redemption date. For a bond that is in its call period, the call price will put an upper limit on the value of the bond in the market. Due to call risk, bondholders will demand a higher yield and will pay a lower price for a callable bond than they would for an otherwise equivalent straight bond. The difference in price between a callable bond and an otherwise identical noncallable bond is equal to the value of the call option to the issuer.

Putable Bonds

A **putable bond** gives the *bondholder* the right to sell the bond back to the issuing company at a prespecified price, typically par. Bondholders are likely to exercise such a put option when the price of the bond is less than the put price because interest rates have risen or the credit quality of the issuer has fallen.

Unlike a callable bond, the embedded option for a putable bond has value to the bondholder because the choice of whether to exercise the option is the bondholder's. For this reason, a putable bond will sell at a higher price (offer a lower yield) than an otherwise equivalent straight bond. The difference in price between an otherwise identical straight bond and a putable bond is equal to the value of the put option to the bondholder.

Convertible Bonds

Convertible bonds give bondholders the option to exchange the bond for a specific number of shares of the issuing corporation's common stock. This gives bondholders the opportunity to profit from increases in the value of the common shares. Because the conversion option is valuable to bondholders, convertible bonds can be issued with higher prices (and, therefore, lower yields, which is an advantage to the issuer) compared to otherwise identical straight bonds.

Some terms related to convertible bonds are as follows:

- **Conversion price.** This is the par amount per share at which the bond may be converted to common stock.
- **Conversion ratio.** This is equal to the par value of the bond divided by the conversion price. If a bond with a $1,000 par value has a conversion price of $40, its conversion ratio is 1,000 / 40 = 25 shares per bond.
- **Conversion value.** This is the market value of the shares that would be received upon conversion. A bond with a conversion ratio of 25 shares when the current market price of a common share is $50 would have a conversion value of 25 × $50 = $1,250.

PROFESSOR'S NOTE
Valuation of convertible bonds is addressed in the Level II CFA curriculum.

Warrants

An alternative way to give bondholders an opportunity for additional returns when the firm's common shares increase in value is to attach **warrants** to straight bonds when they are issued. Warrants give their holders the right to buy the firm's common shares at a fixed price over a given period. As an example, warrants that give their holders the right to buy shares for $40 will have value if the common shares increase in value above $40 before the warrants expire. Warrants can be detached from the bond issue and traded on securities exchanges.

Contingent Convertible Bonds

Contingent convertible bonds (referred to as *CoCos*) are bonds that convert from debt to common equity automatically if a specific event occurs. This type of bond has been issued by some European banks. Banks must maintain specific levels of equity financing. If a bank's equity falls below the required level, they must somehow raise more equity financing to comply with regulations. CoCos are often structured so that if the bank's equity capital falls below a given level, they are automatically converted to common stock. This has the effect of decreasing the bank's debt liabilities and increasing its equity capital at the same time, which helps the bank to meet its minimum equity requirement.

LOS 48.b: Describe how legal, regulatory, and tax considerations affect the issuance and trading of fixed-income securities.

Bonds are subject to different legal and regulatory requirements that depend on where they are issued and traded. Bonds of issuers domiciled in the same country as the market in which the bonds are issued and traded are referred to as **domestic bonds**. Bonds of issuers from countries other than the market in which the bond trades are referred to as **foreign bonds**. For example, a U.K. company raising U.S. dollars to expand their U.S. operations by issuing bonds that trade in the United States is a foreign bond issuance.

Eurobonds are issued outside the jurisdiction of any one country and can be issued in any currency. They are subject to less regulation than domestic bonds in most jurisdictions and were initially introduced to avoid U.S. regulations. Eurobonds should not be confused with bonds denominated in euros or thought to originate in Europe, although they can be both. Eurobonds got the "euro" name because they were first introduced in Europe, and most are still traded by firms in European capitals. A bond issued by a Chinese firm that is denominated in yen and traded in markets outside Japan would fit the definition of a Eurobond (it would be referred to as a Euroyen bond). Eurobonds that trade in at least one domestic bond market and in the Eurobond market are referred to as **global bonds**.

Eurobonds are referred to by the currency they are denominated in. Eurodollar bonds are denominated in U.S. dollars, and Euroyen bonds are denominated in yen. At one time, most Eurobonds were issued in **bearer bond** form. Ownership of bearer bonds was not officially recorded by the issuer; hence, ownership was evidenced simply by possessing the bonds. Today Eurobonds, like most other bonds, are issued as **registered bonds** with a record of ownership.

Foreign bonds, global bonds, and Eurobonds that involve more than one country are often collectively referred to as **international bonds** to distinguish them from domestic bonds, which involve only a single country.

While domestic and international bonds are subject to varying laws and regulations in different jurisdictions and have different conventions relating to coupon frequency and calculation methods, the factor that is likely to best describe differences in yields across different markets is the currency of the bond. This is because the interest rates that determine the bond's yield will be driven by the market interest rates of the country in whose currency the bond is denominated.

Sukuk bonds are Sharia-compliant bonds with specific restrictions on the payment of interest and use of the proceeds of the bond issue to comply with Islamic law. The periodic payments on these bonds are considered to be cash flows from rent on underlying assets.

Taxation of Bond Income

Most often, the interest income paid to bondholders is taxed as ordinary income at the same rate as wage and salary income. The interest income from bonds issued by

municipal governments in the United States, however, is most often exempt from national income tax and often from state income tax in the state of issue.

When a bondholder sells a coupon bond before maturity, it may be at a gain or a loss relative to its purchase price. Such gains and losses are considered capital gains income (rather than ordinary taxable income). Capital gains are often taxed at a lower rate than ordinary income. Capital gains on the sale of an asset that has been owned for more than some minimum amount of time may be classified as long-term capital gains and taxed at an even lower rate.

Zero-coupon bonds and other bonds sold at significant discounts to par when issued are termed **original issue discount (OID) bonds**. Because the gains over an OID bond's tenor as its price moves toward par value are really interest income, these bonds can generate a tax liability even when no cash interest payment has been made. In many tax jurisdictions, a portion of the discount from par at issuance is treated as taxable interest income each year.

Some tax jurisdictions provide a symmetric treatment for bonds issued at a premium to par, allowing part of the premium to be used to reduce the taxable portion of coupon interest payments.

MODULE QUIZ 48.1

1. Compared to a fully amortizing loan, an equivalent loan with a balloon payment will *most likely* have:
   A. lower regular periodic payments and a higher final payment amount.
   B. higher regular periodic payments and a lower final payment amount.
   C. lower regular periodic payments and a lower final payment amount.
2. With which of the following features of a corporate bond issue does an investor *most likely* face the risk of redemption before maturity?
   A. Floating-rate notes.
   B. Sinking fund.
   C. Term maturity structure.
3. A 10-year bond pays no interest for three years, then pays $229.25, followed by payments of $35 semiannually for seven years, and an additional $1,000 at maturity. This bond is *most likely* a:
   A. step-up bond.
   B. zero-coupon bond.
   C. deferred coupon bond.
4. Which of the following *most accurately* describes the maximum price for a currently callable bond?
   A. Its par value.
   B. The call price.
   C. The present value of its par value.
5. An investor buys a pure-discount bond, holds it to maturity, and receives its par value. For tax purposes, the increase in the bond's value is *most likely* to be treated as:
   A. a capital gain.
   B. interest income.

C. tax-exempt income.

KEY CONCEPTS

LOS 48.a

A bond with a bullet structure pays coupon interest periodically and repays the entire principal value at maturity, along with the final coupon interest payment.

A bond with an amortizing structure repays part of its principal at each payment date. A fully amortizing structure makes equal payments throughout the bond's life. A partially amortizing structure has a balloon payment at maturity, which repays the remaining principal as a lump sum.

A sinking fund provision requires the issuer to retire a portion of a bond issue at specified times during the bond's life.

Floating-rate notes have coupon rates that adjust based on a variable market reference rate. Other coupon structures include step-up coupon notes, credit-linked coupon bonds, payment-in-kind bonds, deferred coupon bonds, and index-linked bonds.

Callable bonds allow the issuer to redeem bonds at a specified call price.

Putable bonds allow the bondholder to sell bonds back to the issuer at a specified put price.

Convertible bonds allow the bondholder to exchange bonds for a specified number of shares of the issuer's common stock.

Embedded options benefit the party who has the right to exercise them. Embedded call options benefit the issuer, while embedded put and conversion options benefit the bondholder.

LOS 48.b

Legal and regulatory matters that affect fixed-income securities vary by the places where they are issued and traded, and the location of the issuing entities.

Domestic bonds trade in the issuer's home country and currency. Foreign bonds are from foreign issuers but denominated in the currency of the country where they trade. Eurobonds are issued outside the jurisdiction of any single country and can be issued in any currency. Global bonds are traded in the Eurobond market and at least one domestic market.

Interest income is typically taxed at the same rate as ordinary income, while gains or losses from selling a bond are taxed at the capital gains tax rate. However, the increase in value toward par of original issue discount bonds is considered interest income. In the United States, interest income from municipal bonds is usually tax exempt at the national level and in the issuer's state.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 48.1

1. **A** A balloon payment in a loan schedule is a partial payment of principal that is made at the end of the loan's life. Compared to an otherwise equivalent fully amortizing loan, the existence of the balloon payment will lead to lower periodic payments over the life of the loan because the borrower has to repay less principal before maturity. There will be a higher final payment, however, at maturity. (LOS 48.a)

2. **B** With a sinking fund, the issuer must redeem part of the issue before maturity, but the specific bonds to be redeemed are not known. Floating-rate notes have an unknown future coupon because it relates to a variable market reference rate; however, they have a known maturity date. In an issue with a term maturity structure, all the bonds are scheduled to mature on the same date. (LOS 48.a)

3. **C** This pattern describes a deferred-coupon bond. The first payment of $229.25 is the value of the accrued coupon payments for the first three years. (LOS 48.a)

4. **B** If the price of the bond increases above the call price stipulated in the bond indenture, it will benefit the issuer to call the bond. Theoretically, the price of a currently callable bond should never rise above its call price. (LOS 48.a)

5. **B** Tax authorities typically treat the increase in value of a pure-discount bond toward par as interest income to the bondholder. In many jurisdictions, this interest income is taxed periodically during the life of the bond, even though the bondholder does not receive any cash until maturity. (LOS 48.b)

READING 49

FIXED-INCOME ISSUANCE AND TRADING

MODULE 49.1: FIXED-INCOME ISSUANCE AND TRADING

Video covering this content is available online.

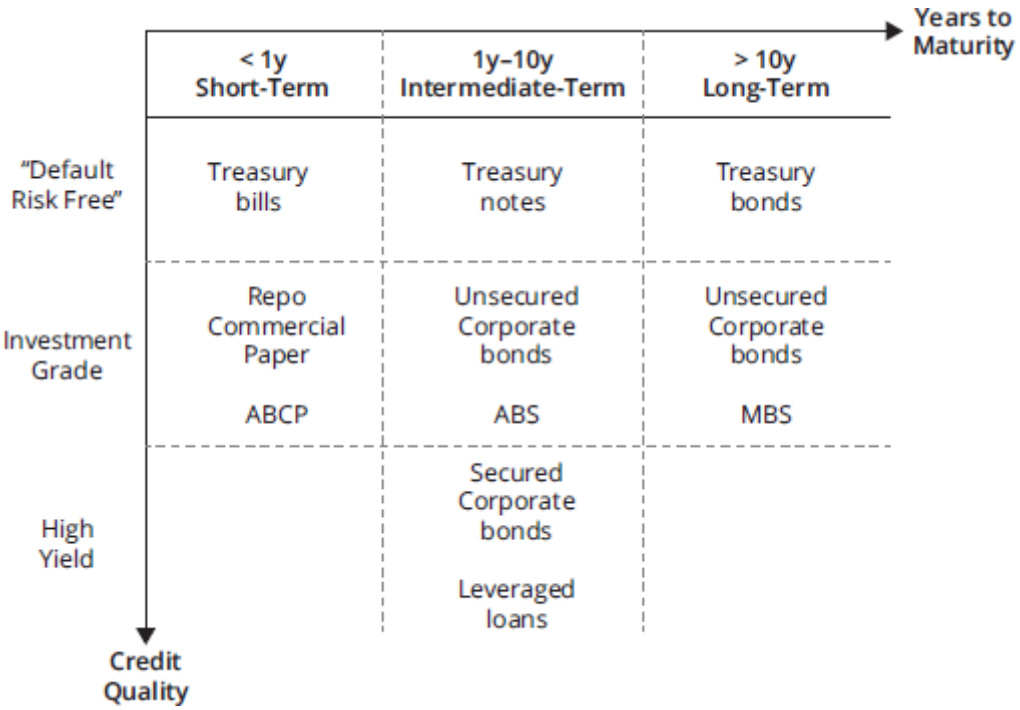
LOS 49.a: Describe fixed-income market segments and their issuer and investor participants.

Global bond markets are primarily segmented by the type of issuer (or *sector*), credit quality, and time to maturity. Other classifications used include currency, the issuer's geography, and environmental, social, and governance (ESG) features.

- *Type of issuer.* Major classifications of bond issuers are governments (sovereign and non-sovereign), corporates, and special purpose entities issuing asset-backed securities (ABSs).
- *Credit quality.* Standard & Poor's (S&P) and Moody's are major examples of **credit rating agencies** that provide credit ratings on bonds. Ratings from AAA down to BBB– (for S&P) and Aaa through Baa3 (Moody's) are considered **investment-grade bonds**. Bonds BB+ or lower (Ba1 or lower for Moody's) are termed **high-yield bonds** (speculative, or "junk" bonds).
- *Original maturities.* Fixed-income markets are usually segmented into short-term investments with original maturities of less than 1 year (known as money market securities), intermediate-term securities with original maturities of 1 to 10 years, and long-term securities with original maturities over 10 years.

The credit/maturity spectrum for issuers is summarized in Figure 49.1.

Figure 49.1: Issuer Credit/Maturity Spectrum



Note: ABCP is asset-backed commercial paper.

Source: Reproduced from Level I CFA Curriculum learning module, "Fixed-Income Issuance and Trading," with permission from CFA Institute.

PROFESSOR'S NOTE

Repos here refers to sale and repurchase agreements, which we will describe in a later reading. For now, it is enough to know that repos are short-term secured borrowing agreements that can be used for short-term financing. Asset-backed commercial paper is a form of short-term asset-backed securities.

Secured corporate bonds appear in the "high-yield" category because we are referring to *new* issues. Companies with less reliable operating cash flows will have to offer security to investors when issuing debt. The high-yield sector also includes the bonds of previously investment-grade issuers that have been downgraded by credit rating agencies due to deteriorating credit quality (such bonds are known as **fallen angels**).

The type of bond that a corporate issuer chooses to issue is generally driven by the access the issuer has to capital markets and by the intended use of the proceeds of the issue.

A well-established, investment-grade company could choose to issue commercial paper to fund short-term working capital requirements, intermediate-term debt to fund medium-term investments and permanent working capital, and long-term debt to fund capital investment in fixed assets. The short- and medium-term issues could be arranged for a fee with a **syndicate** of banks offering **credit facilities**, allowing the issuer to issue securities when required for their business operations. However, a riskier company with less stable operating cash flows is likely to have limited access to secured short-term financing and leveraged loans.