

PART I

FIXED INCOME ESSENTIALS

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CHAPTER 1

FIXED-INCOME SECURITIES: DEFINING ELEMENTS

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LEARNING OUTCOMES

The candidate should be able to:

- 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 whether such provisions benefit the borrower or the lender.

1. INTRODUCTION AND OVERVIEW OF A FIXED-INCOME SECURITY

- **describe basic features of a fixed-income security**

Fixed-income securities constitute the most prevalent means of raising capital globally based on total market value. These instruments allow governments, companies, and other issuers to borrow from investors, promising future interest payments and the return of principal, which are contractual (legal) obligations of the issuer. Fixed-income securities are the largest source of capital for government, not-for-profit, and other entities that do not issue equity. For private companies, fixed-income investors differ from shareholders in not having ownership rights. Payments of interest and repayment of principal (amount borrowed)

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are a higher priority claim on the company's earnings and assets compared with the claim of common shareholders. Since fixed-income claims rank above shareholder claims in the capital structure, a company's fixed-income securities have, in theory, lower risk than their common shares.

Financial analysts who master these and other fixed-income concepts have a distinct edge over their peers for several reasons. First, given the nature of fixed-income cash flows and their preponderance across issuers and regions, these instruments form the basis for risk versus return comparisons both across and within specific jurisdictions. For example, as bonds issued by the US Treasury and other developed market central governments are viewed as having little to no default risk, they serve as building blocks in determining the time value of money for less certain cash flows. Fixed-income securities also fulfill an important role in portfolio management as a prime means by which individual and institutional investors can fund known future obligations, such as tuition payments or retirement obligations. Finally, while the correlation of fixed-income returns with common share returns varies, adding fixed-income securities to portfolios that include common shares can be an effective way of obtaining diversification benefits.

Among the questions to be addressed are the following:

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

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. Moreover, the term “fixed income” is not to be understood literally: Some fixed-income securities have interest payments that change over time.

1.1. Overview of a Fixed-Income Security

A **bond** is a contractual agreement between the issuer and the bondholders. Three important elements that an investor needs to know about when considering a fixed-income security are:

- 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 providing either issuers or 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 subsequent sections.

1.1.1. Basic Features of a Bond

All bonds, regardless of issuer, are characterized by the same basic features, which include maturity, par or principal amount, coupon size, frequency, and currency.

1.1.1.1. 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. As sovereign bonds are backed by the full faith and credit of each respective government, they usually represent the lowest risk and most secure bonds in each market;
- Non-sovereign (local) governments, such as the State of Minnesota in the United States, the Catalonia region in Spain, or the City of Edmonton in Alberta, 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 (i.e., special purpose entities) that use specific assets, such as auto loans and credit card debt obligations, to guarantee (or secure) a bond issue known as an asset-backed security that is 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 just listed), the corporate sector (the fifth type listed), and the structured finance sector (the last type listed).

While several major local fixed-income markets, such as China and Japan, are dominated by government issuers, a significant portion of the US bond market consists of corporate issuance and asset-backed securities in addition to US treasury securities issued by the federal government.

Asset-backed securities (ABS) are created from 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. Many elements discussed in this chapter apply to both traditional bonds and ABS. Considerations specific to ABS are discussed in a separate chapter on asset-backed securities.

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. The three largest credit rating agencies are Moody's Investors Service, Standard & Poor's, and Fitch Ratings. One major distinction is between investment-grade and non-investment-grade bonds, also called high-yield or speculative bonds. For example, bonds rated Baa3 or higher by Moody's and BBB– or higher by Standard & Poor's and Fitch are considered investment grade. 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 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.

1.1.1.2. 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. Tenor is an important consideration in analyzing a bond's risk and return, as it indicates the period over which the bondholder can expect to receive 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.

1.1.1.3. 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 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.

1.1.1.4. 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 underlying assets. 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 a floating rate of interest; such bonds are called **floating-rate notes** (FRNs) or **floaters**. The coupon rate of an FRN includes two components: a **market reference rate (MRR)** plus a spread. The spread, also called margin, is typically constant and is expressed in basis points (bps). A **basis point** is equal to 0.01% (i.e., 100 basis points equals 1%). The spread is set when the bond is issued based on the issuer's creditworthiness at issuance: The higher the issuer's credit quality, the lower the spread. The MRR, however, resets periodically. Thus, as the MRR changes, the coupon rate and coupon payment change accordingly.

The market reference rate is a collective name for a set of rates covering different currencies for different maturities, ranging from overnight to one year. These rates have historically included the London Interbank Offered Rate (Libor), the Euro Interbank Offered Rate (Euribor), the Hong Kong Interbank Offered Rate (Hibor), or the Singapore Interbank Offered Rate (Sibor) for issues denominated in US dollars, euros, Hong Kong dollars, and Singapore dollars, respectively. The process of phasing out Libor and moving to new market reference rates is discussed in a subsequent CFA Level I chapter.

For example, assume that the coupon rate of an FRN that makes semi-annual interest payments in June and December is expressed as the six-month MRR + 150 bps. Suppose that in December 20X0, the six-month MRR is 3.25%. The interest rate that will apply to the payment due in June 20X1 will be 4.75% (3.25% + 1.50%). Now suppose that in June 20X1, the six-month MRR has decreased to 3.15%. The interest rate that will apply to the payment due in December 20X1 will decrease to 4.65% (3.15% + 1.50%).

All bonds, whether they pay a fixed or floating rate of interest, make periodic coupon payments except for **zero-coupon bonds**. Zero-coupon, or **pure discount bonds**, are issued at a discount to par value and are redeemed at par. The interest earned on a zero-coupon bond is implied and equal to the difference between the par value and the purchase price. For example, if the par value is \$1,000 and the purchase price is \$950, the implied interest is \$50.

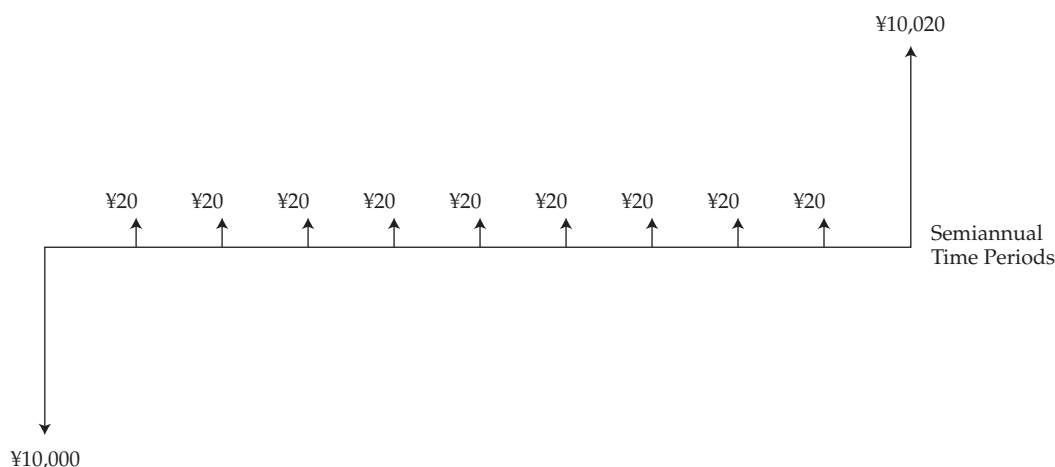
1.1.1.5. Currency Denomination Bonds can be issued in any currency, although a large number of bond issues are made in either euros or US dollars. The currency of issue may affect a bond's attractiveness. Borrowers in emerging markets often elect to issue bonds in euros or US dollars because doing so makes the bonds more attractive to international investors than bonds in a domestic currency that may be illiquid or not freely traded. Issuers may also choose to borrow in a foreign currency if they expect cash flows in that currency to offset interest payments and principal repayments. If a bond is aimed solely at a country's domestic investors, it is more likely that the borrower will issue in the local currency.

Dual-currency bonds make coupon payments in one currency and pay the par value at maturity in another currency. For example, assume that a Japanese company needs to finance a long-term project in the United States that will take several years to become profitable. The Japanese company could issue a yen/US dollar dual-currency bond. The coupon payments in yen can be made from the cash flows generated in Japan, and the principal can be repaid in dollars once the project becomes profitable.

Currency option bonds can be viewed as a combination of a single-currency bond plus a foreign currency option. They give bondholders the right to choose the currency in which they want to receive interest payments and principal repayments. Bondholders can select one of two currencies for each payment.

Exhibit 1 brings all the basic features of a bond together and illustrates how these features determine the cash flow pattern for a plain vanilla bond. The bond is a five-year Japanese government bond (JGB) with a coupon rate of 0.4% and a par value of ¥10,000. Interest payments are made semi-annually. The bond is priced at par when it is issued and is redeemed at par.

EXHIBIT 1 Cash Flows for a Plain Vanilla Bond



The downward-pointing arrow in Exhibit 1 represents the cash flow paid by the bond investor (received by the issuer) on the day of the bond issue—that is, ¥10,000. The upward-pointing arrows are the cash flows received by the bondholder (paid by the issuer) during the bond's life. As interest is paid semi-annually, the coupon payment is ¥20 $[(0.004 \times ¥10,000) \div 2]$ every six months for five years—that is, 10 coupon payments of ¥20. The last payment is equal to ¥10,020 because it includes both the last coupon payment and the payment of the par value.

EXAMPLE 1

1. An example of a sovereign bond is a bond issued by:
 - A. the World Bank.
 - B. the city of New York.
 - C. the federal German government.
2. The risk of loss resulting from the issuer failing to make full and timely payment of interest is called:
 - A. credit risk.
 - B. systemic risk.
 - C. interest rate risk.
3. A money market security *most likely* matures in:
 - A. one year or less.
 - B. between 1 and 10 years.
 - C. over 10 years.
4. If the bond's price is higher than its par value, the bond is trading at:
 - A. par.
 - B. a discount.
 - C. a premium.
5. A bond has a par value of £100 and a coupon rate of 5%. Coupon payments are made semi-annually. The periodic interest payment is:
 - A. £2.50, paid twice a year.
 - B. £5.00, paid once a year.
 - C. £5.00, paid twice a year.

6. The coupon rate of a floating-rate note that makes payments in June and December is expressed as six-month MRR + 25 bps. Assuming that the six-month MRR is 3.00% at the end of June 20XX and 3.50% at the end of December 20XX, the interest rate that applies to the payment due in December 20XX is:
 - A. 3.25%.
 - B. 3.50%.
 - C. 3.75%.
7. The type of bond that allows bondholders to choose the currency in which they receive each interest payment and principal repayment is a:
 - A. pure discount bond.
 - B. dual-currency bond.
 - C. currency option bond.

Solution to 1: C is correct. A sovereign bond is a bond issued by a national government, such as the federal German government. A is incorrect because a bond issued by the World Bank is a supranational bond. B is incorrect because a bond issued by a local government, such as the city of New York, is a non-sovereign bond.

Solution to 2: A is correct. Credit risk is the risk of loss resulting from the issuer failing to make full and timely payments of interest and/or repayments of principal. B is incorrect because systemic risk is the risk of failure of the financial system. C is incorrect because interest rate risk is the risk that a change in market interest rate affects a bond's value.

Solution to 3: A is correct. The primary difference between a money market security and a capital market security is the maturity at issuance. Money market securities mature in one year or less, whereas capital market securities mature in more than one year.

Solution to 4: C is correct. If a bond's price is higher than its par value, the bond is trading at a premium. A is incorrect because a bond is trading at par if its price is equal to its par value. B is incorrect because a bond is trading at a discount if its price is lower than its par value.

Solution to 5: A is correct. The annual coupon payment is $5\% \times £100 = £5.00$. The coupon payments are made semi-annually, so £2.50 paid twice a year.

Solution to 6: A is correct. The interest rate that applies to the payment due in December 20XX is the six-month MRR at the end of June 20XX plus 25 bps. Thus, it is 3.25% ($3.00\% + 0.25\%$).

Solution to 7: C is correct. A currency option bond gives bondholders the right to choose the currency in which they want to receive each interest payment and principal repayment. A is incorrect because a pure discount bond is issued at a discount to par value and redeemed at par. B is incorrect because a dual-currency bond makes coupon payments in one currency and pays the par value at maturity in another currency.

1.1.2. Yield Measures

Several yield measures are commonly used by market participants. The **current yield** or **running yield** is equal to the bond's annual coupon divided by the bond's price, expressed as a percentage. For example, if a bond has a coupon rate of 6%, a par value of \$1,000, and a price of \$1,010, the current yield is 5.94% ($\$60 \div \$1,010$). The current yield is a measure of income that is analogous to the dividend yield for a common share.

The most common yield measure is known as the **yield-to-maturity**, also called the **yield-to-redemption** or **redemption yield**. The yield-to-maturity is the internal rate of return on a bond's expected cash flows—that is, the discount rate that equates the present value of the bond's expected cash flows until maturity with the bond's price. The yield-to-maturity can be considered an estimate of the bond's expected return; it reflects the annual return earned by an investor who purchases the bond today and holds it until maturity, provided they receive all promised cash flows and are able to reinvest all coupons at this same yield. There is an inverse relationship between the bond's price and its yield-to-maturity, all else being equal. That is, the higher the bond's yield-to-maturity, the lower its price. Alternatively, the higher the bond's price, the lower its yield-to-maturity. Thus, investors expecting interest rates to fall (and investors to demand a lower yield-to-maturity) anticipate a positive return from price appreciation. The topic of risk and return of fixed-income securities is covered in more detail in a subsequent chapter.

2. BOND INDENTURE

- **describe content of a bond indenture**
- **compare affirmative and negative covenants and identify examples of each**

As contractual agreements between the issuer and the bondholders, bonds are subject to legal, regulatory, and tax considerations that are important to fixed-income investors.

2.1. Bond Indenture

The **trust deed** is the legal contract that describes the form of the bond, the obligations of the issuer, and the rights of the bondholders. This legal contract is often referred to as the bond **indenture**, particularly in the United States and Canada. The indenture references both the issuer and the features of the bond issue, such as the principal value, the interest or coupon rate, the interest payment dates, the maturity date, and any contingency provisions. The indenture also identifies the funding sources for interest and principal payments and any collateral, credit enhancements, or covenants. **Collateral** is a specific asset or assets or financial guarantees securing the debt obligation above and beyond the issuer's promise to pay. **Credit enhancements** are provisions used to reduce the credit risk of the bond issue. **Covenants** are clauses that specify the rights of the bondholders and any actions that the issuer is obligated to perform or prohibited from performing.

Because it would be impractical for the issuer to enter into a direct agreement with each bondholder, the indenture is usually held by a trustee. The trustee is typically a financial institution acting as a **fiduciary** (or representative protecting investor interests) to ensure the issuer complies with the obligations specified in the indenture and to take action on behalf of the bondholders, when necessary. The trustee's duties are administrative and include the maintenance of required documentation and records; holding beneficial title to, safeguarding, and appraising collateral (if any); invoicing the issuer for interest payments and principal repayments; and holding funds until they are paid, although the cash flow movements from issuers to the trustee are typically handled by the principal paying agent. In the event of default, the discretionary powers of the trustee increase considerably. For example, the trustee is responsible for calling bondholder meetings to discuss actions as well as bringing legal action against an issuer on behalf of bondholders, if necessary.

For a plain vanilla bond, the indenture is often a standard template that is updated for a bond's specific terms and conditions. For exotic bonds, the document is tailored and can often be several hundred pages.

The indenture identifies basic bond features (e.g., investor rights in the event of default) that impact the bond's risk–reward profile, such as:

- the legal identity of the bond issuer and its legal form;
- the source of repayment proceeds;
- the asset or collateral backing (if any);
- the credit enhancements (if any); and
- the covenants (if any).

We consider each of these areas in the following sections.

2.1.1. Legal Identity of the Bond Issuer and Its Legal Form

The bond issuer, identified in the indenture by its legal name, must make all contractual payments assigned to the bond issuer. For a sovereign bond, the legal issuer is usually the office responsible for managing the national budget, such as HM Treasury (Her Majesty's Treasury) in the United Kingdom. The legal issuer may be different from the body that administers the bond issue process. Using the UK example, the legal obligation to repay gilts lies with HM Treasury, but the bonds are issued by the UK Debt Management Office, an executive agency of HM Treasury.

For corporate bonds, the issuer is usually the corporate legal entity—for example, Wal-Mart Stores Inc., Samsung Electronics Co. Ltd., or Volkswagen AG. However, bonds are sometimes issued by a subsidiary of a parent legal entity. In this case, investors should consider the credit quality of the subsidiary, unless the indenture specifies that the bond liabilities are guaranteed by the parent. When rated, subsidiaries often receive a credit rating below that of the parent.

Bonds are sometimes issued by a holding company, or parent legal entity for a group of companies, rather than by one of the operating companies in the group. A holding company may be rated differently from its operating companies, and investors may lack recourse to assets held by those companies. If the bonds are issued by a holding company with few assets to call on in the event of default, investors face more credit risk than if the bonds were issued by an operating company in the group.

For ABS, the legal obligation to repay the bondholders often lies with the special legal entity created by the sponsor or originator, a financial institution in charge of the securitization process. The special legal entity is most frequently referred to as a special purpose entity (SPE) in the United States and a special purpose vehicle (SPV) in Europe, also called a special purpose company (SPC). The legal form for the special legal entity may be a limited partnership, a limited liability company, or a trust. Typically, special legal entities are thinly capitalized, have no independent management or employees, and have no purpose other than the transactions for which they were created.

The sponsor transfers the assets to the special legal entity to carry out a securitization or series of securitizations. A key reason for forming a special legal entity is *bankruptcy remoteness*. The transfer of assets by the sponsor is considered a legal sale; once the assets have been securitized, the sponsor no longer has ownership rights. Any party making claims following the bankruptcy of the sponsor would be unable to recover the assets or their proceeds. As a result, the special legal entity's ability to pay interest and repay the principal should remain intact even if the sponsor were to fail—hence the reason why the special legal entity is also called a bankruptcy-remote vehicle.

2.1.2. Source of Repayment Proceeds

The indenture usually describes how the issuer intends to service the debt (make interest payments) and repay the principal. Generally, the source of repayment for bonds issued by supranational organizations is either the repayment of previous loans made by the organization or the paid-in capital from its members. National governments may also act as guarantors for certain bond issues. If additional sources of repayment are needed, the supranational organization may call on its members to provide funds.

Sovereign bonds are backed by the “full faith and credit” of the national government. As national governments have unique powers to ensure the ability to repay debt—such as the authority to tax economic activity, print money, and control foreign currency reserves—sovereign bonds denominated in local currency are generally considered the safest of all investments. It is therefore highly probable that interest and principal will be paid fully and on time, resulting in lower yields on sovereign bonds than for similar bonds from other local issuers. Government yields are often used as a “risk-free rate” for time value of money calculations as well as a benchmark reference rate for pricing fixed-income securities from other issuers of the same tenor.

There are three major sources for repayment of non-sovereign government debt issues, and bonds are usually classified according to these sources. The first source is through the general taxing authority of the issuer. The second source is from the cash flows of the project the bond issue is financing. The third source is from special taxes or fees established specifically for the purpose of funding interest payments and principal repayments.

The source of payment for corporate bonds is the issuer’s ability to generate cash flows, primarily through its operations. These cash flows depend on the issuer’s financial strength and integrity. Because corporate bonds carry a higher level of credit risk than otherwise similar sovereign and non-sovereign government bonds, they typically offer a higher yield.

In contrast to corporate bonds, the source of payment for ABS depends on the cash flows generated by one or more of the underlying financial assets, such as mortgages or auto loans, rather than an operating entity. Thus, investors in ABS must pay special attention to the quality of these assets.

2.1.3. Asset or Collateral Backing

Collateral backing is a way to alleviate credit risk. Investors should review where they rank compared with other creditors in the event of default and analyze the quality of the collateral backing the bond issue.

2.1.3.1. Seniority Ranking **Secured bonds** are backed by assets or financial guarantees pledged to ensure debt repayment in the case of default. In contrast, unsecured bonds have no collateral; bondholders have only a general claim on the issuer’s assets and cash flows. Thus, unsecured bonds are paid after secured bonds in the event of default. By lowering credit risk, collateral backing increases the bond issue’s credit quality and decreases its yield.

A bond’s collateral backing might not specify an identifiable asset but instead may be described as the “general plant and infrastructure” of the issuer. In such cases, investors rely on seniority ranking—that is, the systematic way in which lenders are repaid in case of bankruptcy or liquidation. What matters to investors is where they rank compared with other creditors rather than whether an asset of sufficient quality and value is in place to cover their claims. Senior debt has a priority claim over subordinated debt or junior debt. Financial institutions issue a large volume of both senior unsecured and subordinated bonds globally; it is not uncommon to see large and small banks issue such bonds. For example, banks as diverse as

Royal Bank of Scotland in the United Kingdom and Prime Bank in Bangladesh issue senior unsecured bonds to institutional investors.

Debentures are a type of bond that can be secured or unsecured. In many jurisdictions, debentures are unsecured bonds, with no collateral backing assigned to the bondholders. In contrast, in the United Kingdom and in other Commonwealth countries, such as India, debentures are usually backed by an asset or pool of assets assigned as collateral support for the bond obligations and segregated from other creditor claims. Thus, it is important for investors to review the indenture to determine whether a debenture is secured or unsecured. If the debenture is secured, debenture holders rank above unsecured creditors of the company; they have a specific asset or pool of assets that the trustee can call on to realize the debt in the event of default.

2.1.3.2. Types of Collateral Backing Many types of bonds are secured by a form of collateral. Some companies issue collateral trust bonds and equipment trust certificates. **Collateral trust bonds** are backed by securities, such as common shares, other bonds, or other financial assets. These securities are pledged by the issuer and typically held by the trustee. **Equipment trust certificates** are bonds secured by specific types of equipment or physical assets, such as aircraft, railroad cars, shipping containers, or oil rigs. They are often issued to take advantage of the tax benefits of leasing. For example, suppose an airline finances the purchase of new aircraft with equipment trust certificates. The legal title to the aircraft is held by the trustee, which issues equipment trust certificates to investors in the amount of the aircraft purchase price. The trustee leases the aircraft to the airline and collects lease payments from the airline to pay the interest on the certificates. When the certificates mature, the trustee sells the aircraft to the airline, uses the proceeds to retire the principal, and cancels the lease.

Mortgaged property is one of the most common forms of ABS collateral. MBS are debt obligations that represent claims to the cash flows from pools of mortgage loans, most commonly on residential property. Mortgage loans are purchased from banks, mortgage companies, and other originators and then assembled into pools by a governmental, quasi-governmental, or private entity.

Financial institutions, particularly in Europe, issue covered bonds. **Covered bonds** are debt obligations backed by a segregated pool of assets. They are similar to ABS but offer bondholders recourse against both the financial institution and the underlying asset pool. Covered bonds will be addressed in detail in a later chapter.

2.1.4. Credit Enhancements

Credit enhancements refer to a variety of provisions that can be used to reduce the credit risk of a bond issue. Thus, they increase the issue's credit quality and decrease the bond's yield. Credit enhancements are very often used when creating ABS.

The two primary types of credit enhancements are internal and external. Internal credit enhancement relies on structural features regarding the bond issue. External credit enhancement refers to financial guarantees received from a third party, often called a financial guarantor. We describe each type in the following sections.

2.1.4.1. Internal Credit Enhancement The most common forms of internal credit enhancement are subordination, overcollateralization, and reserve accounts.

Subordination, also known as **credit tranching**, is the most popular internal credit enhancement technique. It relies on creating more than one bond class or tranche and ordering the claim priorities for ownership or interest in an asset between the tranches. The cash

flows generated by the assets are allocated with different priority to tranches of different seniority. The ordering of the claim priorities is called a senior/subordinated structure, where the tranches of highest seniority are senior followed by subordinated or junior tranches. The subordinated tranches function as credit protection for the more senior tranches, in the sense that the most senior tranche has the first claim on available cash flows. This type of protection is also commonly referred to as a waterfall structure because in the event of default, the proceeds from liquidating assets will first be used to repay the most senior creditors. Thus, if the issuer defaults, losses are allocated from the bottom up—that is, from the most junior to the most senior tranche. The most senior tranche is typically unaffected unless losses exceed the amount of the subordinated tranches, which is why the most senior tranche is usually rated Aaa/AAA.

Overcollateralization refers to the process of posting more collateral than is needed to obtain or secure financing. It represents a form of internal credit enhancement because the additional collateral can be used to absorb losses. For example, a bond issue of \$100 million with collateral value of \$110 million has excess collateral of \$10 million. Over time, the amount of overcollateralization changes. This can happen because of amortization, prepayments, or defaults as well as changes in collateral values. For example, one of the most significant contributors to the 2007–2009 global financial crisis was a valuation problem with the residential housing assets backing MBS. While many properties were originally valued above the value of securities outstanding, as property prices fell and the number of defaults rose, the credit quality of these MBS declined sharply. This resulted in a rapid rise in yields and losses among investors in these securities.

Reserve accounts or **reserve funds** are another internal credit enhancement in the form of either a cash reserve fund or an excess spread account. A cash reserve fund is a cash deposit used to absorb losses. An excess spread account is an allocation of any asset cash flows remaining after paying interest to bondholders. The excess spread (or excess interest cash flow) can be retained and deposited into a reserve account as a first line of protection against losses. In a process called “turboing,” the excess spread can be used to retire the principal, with the most senior tranche having the first claim on these funds.

2.1.4.2. External Credit Enhancement The most common forms of external credit enhancement are bank guarantees and surety bonds, letters of credit, and cash collateral accounts.

Bank guarantees and **surety bonds** are very similar in nature because they both reimburse bondholders for any losses incurred if the issuer defaults. However, there is usually a maximum amount that is guaranteed, called the penal sum. The major difference between a bank guarantee and a surety bond is that the former is issued by a bank, whereas the latter is issued by a rated and regulated insurance company. Insurance companies that specialize in providing financial guarantees are typically called monoline insurance companies or monoline insurers. Monoline insurers played an important role in securitization until the 2007–2009 global financial crisis, but they are now a less common form of credit enhancement due to the credit downgrades of these insurers during the crisis.

A **letter of credit** from a financial institution is another form of external credit enhancement for a bond issue. The financial institution provides the issuer with a credit line to reimburse any cash flow shortfalls from the assets backing the issue. Letters of credit have also become a less common form of credit enhancement since the credit downgrades of financial institutions during the financial crisis.

Bank guarantees, surety bonds, and letters of credit expose the investor to third-party (or counterparty) risk—that is, the possibility that a guarantor cannot meet its obligations. A **cash collateral account** mitigates this concern because the issuer immediately borrows the credit enhancement amount and usually invests it in highly rated short-term commercial

paper. Because a cash collateral account is an actual deposit rather than a pledge of cash, a cash collateral account provider downgrade will not necessarily result in a downgrade of the bond issue backed by that provider.

2.1.5. Covenants

Bond covenants are legally enforceable rules that borrowers and lenders agree on at the time of a new bond issue. An indenture will frequently include affirmative (or positive) and negative covenants. Affirmative covenants enumerate what issuers are required to do, whereas negative covenants specify what issuers are prohibited from doing.

Affirmative covenants are typically administrative in nature. For example, frequently used affirmative covenants include what the issuer will do with the proceeds from the bond issue and the promise of making the contractual payments. The issuer may also promise to comply with all laws and regulations, maintain its current lines of business, insure and maintain its assets, and pay taxes as they come due. Other examples include a **pari passu** (or “equal footing”) clause, which ensures that a debt obligation is treated the same as the borrower’s other senior debt instruments, or a **cross-default** clause, which specifies that a borrower is considered in default if they default on another debt obligation. These types of covenants typically do not impose additional costs to the issuer and do not materially constrain the issuer’s discretion regarding how to operate its business.

In contrast, negative covenants are frequently costly and materially constrain the issuer’s potential business decisions. They protect bondholders from the dilution of their claims, asset withdrawals or substitutions, and suboptimal investments by the issuer. Examples of negative covenants include the following:

- *Restrictions on debt* regulate the issue of additional debt. Maximum acceptable debt usage ratios (sometimes called leverage ratios or gearing ratios) and minimum acceptable interest coverage ratios are frequently specified, permitting new debt to be issued only when justified by the issuer’s financial condition.
- *Negative pledges* prevent the issuance of debt that would be senior to or rank in priority ahead of the existing bondholders’ debt.
- *Restrictions on prior claims* protect unsecured bondholders by preventing the issuer from using assets that are not collateralized (called unencumbered assets) to become collateralized.
- *Restrictions on distributions to shareholders* restrict dividends and other payments to shareholders, such as share buybacks (repurchases). The restriction typically operates by reference to the borrower’s profitability; that is, the covenant sets a base date, usually at or near the time of the issue, limiting dividends and share buybacks to a percentage of earnings or cumulative earnings after that date.
- *Restrictions on asset disposals* limit the amount of assets that can be disposed by the issuer during the bond’s life. This limit on cumulative disposals as a percentage of a company’s gross assets is intended to protect bondholder claims by preventing a break-up of the company.
- *Restrictions on investments* constrain risky investments by blocking speculative investments and ensuring an issuer devotes its capital to its going-concern business. A companion covenant may require the issuer to stay in its present line of business.
- *Restrictions on mergers and acquisitions* prevent these actions unless the company is the surviving company or the acquirer delivers a supplemental indenture to the trustee expressly assuming the old bonds and terms of the old indenture. These requirements effectively prevent a company from avoiding its obligations to bondholders by selling to another company.

These are only a few examples of negative covenants. The common characteristic of all negative covenants is ensuring that the issuer will not take any actions that would significantly reduce its ability to make interest payments and repay the principal. Bondholders, however, rarely wish to be too specific about how an issuer should run its business because doing so would imply a degree of control that bondholders legally want to avoid. In addition, very restrictive covenants may not be in the bondholders' best interest if they force the issuer to default when default is avoidable. For example, strict restrictions on debt may prevent the issuer from raising new funds that are necessary to meet its contractual obligations; strict restrictions on asset disposals may prohibit the issuer from selling assets or business units and obtaining the necessary liquidity to make interest payments or principal repayments; and strict restrictions on mergers and acquisitions may prevent the issuer from being taken over by a stronger company that would be able to honor the issuer's contractual obligations.

EXAMPLE 2

1. The term *most likely* used to refer to the legal contract under which a bond is issued is:
 - A. indenture.
 - B. debenture.
 - C. letter of credit.
2. The individual or entity that *most likely* assumes the role of trustee for a bond issue is:
 - A. a financial institution appointed by the issuer.
 - B. the treasurer or chief financial officer of the issuer.
 - C. a financial institution appointed by a regulatory authority.
3. The individual or entity *most likely* responsible for the timely payment of interest and repayment of principal to bondholders is the:
 - A. trustee.
 - B. primary or lead bank of the issuer.
 - C. treasurer or chief financial officer of the issuer.
4. The major advantage of issuing bonds through a special legal entity is:
 - A. bankruptcy remoteness.
 - B. beneficial tax treatments.
 - C. greater liquidity and lower issuing costs.
5. The category of bond *most likely* repaid from the repayment of previous loans made by the issuer is:
 - A. sovereign bonds.
 - B. supranational bonds.
 - C. non-sovereign bonds.
6. The type of collateral used to secure collateral trust bonds is *most likely*:
 - A. securities.
 - B. mortgages.
 - C. physical assets.
7. The external credit enhancement that has the *least* amount of third-party risk is a:
 - A. surety bond.
 - B. letter of credit.
 - C. cash collateral account.

8. An example of an affirmative covenant is the requirement:
 - A. that dividends will not exceed 60% of earnings.
 - B. to insure and perform periodic maintenance on financed assets.
 - C. that the debt-to-equity ratio will not exceed 0.4 and times interest earned will not fall below 8.0.
9. An example of a covenant that protects bondholders against the dilution of their claims is a restriction on:
 - A. debt.
 - B. investments.
 - C. mergers and acquisitions.

Solution to 1: A is correct. The contract between a bond issuer and the bondholders is very often called an indenture or deed trust. The indenture documents the terms of the issue, including the principal amount, the coupon rate, and the payments schedule. It also provides information about the funding sources for the contractual payments and specifies whether there are any collateral, credit enhancement, or covenants. B is incorrect because a debenture is a type of bond. C is incorrect because a letter of credit is an external credit enhancement.

Solution to 2: A is correct. The issuer chooses a financial institution with trust powers, such as the trust department of a bank or a trust company, to act as a trustee for the bond issue.

Solution to 3: A is correct. Although the issuer is ultimately the source of the contractual payments, it is the trustee that ensures timely payments. Doing so is accomplished by invoicing the issuer for interest payments and principal repayments and holding the funds until they are paid.

Solution to 4: A is correct. A special legal entity is a bankruptcy-remote vehicle. Bankruptcy remoteness is achieved by transferring the assets from the sponsor to the special legal entity. Once this transfer is completed, the sponsor no longer has ownership rights. If the sponsor defaults, no claims can be made to recover the assets that were transferred or the proceeds from the transfer to the special legal entity.

Solution to 5: B is correct. The source of payment for bonds issued by supranational organizations is either the repayment of previous loans made by the organization or the paid-in capital of its member states. A is incorrect because national governments rely on their taxing authority and money creation to repay their debt. C is incorrect because non-sovereign bonds are typically repaid from the issuer's taxing authority or the cash flows of the project being financed.

Solution to 6: A is correct. Collateral trust bonds are secured by securities, such as common shares, other bonds, or other financial assets. B is incorrect because MBS are secured by mortgages. C is incorrect because equipment trust certificates are backed by physical assets, such as aircraft, railroad cars, shipping containers, or oil rigs.

Solution to 7: C is correct. The third-party (or counterparty) risk for a surety bond and a letter of credit arises from both being future promises to pay. In contrast, a cash collateral account allows the issuer to immediately borrow the credit-enhancement amount and then invest it.

Solution to 8: B is correct. Affirmative covenants indicate what the issuer “must do” and are administrative in nature. A covenant requiring the issuer to insure and perform periodic maintenance on financed assets is an example of an affirmative covenant. A and C are incorrect because they are negative covenants; they indicate what the issuer cannot do.

Solution to 9: A is correct. A restriction on debt typically takes the form of a maximum acceptable debt usage ratio or a minimum acceptable interest coverage ratio. Thus, it limits the issuer’s ability to issue new debt that would dilute the bondholders’ claims. B and C are incorrect because they are covenants that restrict the issuer’s business activities by preventing the company from making investments or being taken over, respectively.

3. LEGAL, REGULATORY, AND TAX CONSIDERATIONS

- **describe how legal, regulatory, and tax considerations affect the issuance and trading of fixed-income securities**

Fixed-income securities are subject to different legal and regulatory requirements across jurisdictions, depending on where they are issued and traded as well as who holds them.

An important consideration for investors is where the bonds are issued and traded because it affects the laws and regulations that apply. The *global bond* markets consist of national bond markets and the Eurobond market. A *national bond* market includes all the bonds that are issued and traded in a specific country and are denominated in the currency of that country. Bonds issued by entities that are incorporated in that country are called *domestic bonds*, whereas bonds issued by entities that are incorporated in another country are called *foreign bonds*. If Ford Motor Company issues bonds denominated in US dollars in the United States, for example, these bonds will be classified as domestic. If Volkswagen Group and Toyota Motor Corporation (or their German or Japanese subsidiaries) issue bonds denominated in US dollars in the United States, these bonds will be classified as foreign. Foreign bonds very often receive nicknames. For example, foreign bonds are called “kangaroo bonds” in Australia, “maple bonds” in Canada, “panda bonds” in China, “samurai bonds” in Japan, “kimchi bonds” in South Korea, “matryoshka bonds” in Russia, “matador bonds” in Spain, “bulldog bonds” in the United Kingdom, and “Yankee bonds” in the United States. National regulators may make distinctions both between and among resident and non-resident issuers, and they may have different requirements regarding the issuance process, the level of disclosures, or the restrictions imposed on the bond issuer and/or the investors as to who can purchase the bonds.

Governments and companies have issued foreign bonds in London since the 19th century, and foreign bond issues expanded in such countries as the United States, Japan, and Switzerland during the 1980s. But the 1960s saw the emergence of another bond market: the Eurobond market. The Eurobond market was created primarily to bypass the legal, regulatory, and tax constraints imposed on bond issuers and investors, particularly in the United States. Bonds issued and traded on the Eurobond market are called **Eurobonds**, and they are named after the currency in which they are denominated. For example, Eurodollar and Euroyen bonds are denominated in US dollars and Japanese yens, respectively. Bonds that are denominated in euros are called euro-denominated Eurobonds.

Eurobonds are issued outside the jurisdiction of any single country, are usually unsecured, and may be denominated in any currency, including the issuer’s domestic currency. They are underwritten by an international syndicate—that is, a group of financial institutions from different

jurisdictions—and mostly sold to investors in Europe, the Middle East, and Asia. Eurobonds denominated in US dollars cannot be sold to US investors at the time of issue because they are not registered with the US Securities and Exchange Commission (SEC). In the past, Eurobonds typically were **bearer bonds**, meaning that the trustee did not keep records of who owned the bonds; only the clearing system knew who the bond owners were. Eurobonds, domestic, and foreign bonds are now **registered bonds** for which ownership is recorded by either name or serial number.

A global bond is one issued simultaneously in the Eurobond market and in at least one domestic bond market, ensuring sufficient demand for large bond issues and access to all fixed-income investors regardless of location. For example, the World Bank is a regular issuer of global bonds. Many market participants refer to foreign bonds, Eurobonds, and global bonds as international bonds as opposed to domestic bonds.

Domestic bonds, foreign bonds, Eurobonds, and global bonds are subject to different legal, regulatory, and tax requirements. They also have different interest payment frequencies and interest payment calculation methods that affect bond cash flows and prices. Note, however, that the currency in which a bond is denominated has a stronger effect on its price than where the bond is issued or traded. This is because market interest rates have a strong influence on a bond's price, and the market interest rates that affect a bond are those associated with the currency in which the bond is denominated.

As the emergence and growth of the Eurobond market illustrates, legal and regulatory considerations affect the dynamics of the global fixed-income markets. Exhibit 2 compares the amounts of total and international debt outstanding for the 15 countries that were the largest debt issuers at the end of December 2019. The reported amounts are based on the residence of the issuer.

EXHIBIT 2 Total and International Debt Securities by Residence of Issuer at the End of December 2019

Issuers	Total Debt Securities (US\$ billions)	International Debt Securities (US\$ billions)
United States	41,232	2,356
China	14,726	217
Japan	12,825	480
United Kingdom	6,288	3,288
France	4,670	1,433
Germany	3,548	1,290
Canada	3,361	971
Italy	3,194	840
Netherlands	2,193	2,109
Spain	1,972	532
Australia	1,959	595
Luxembourg	1,084	936
Ireland	824	893
Denmark	793	124
Belgium	729	167

Source: Based on data from the Bank for International Settlements, Table C1, available at www.bis.org/statistics/secstats.htm (updated 3 June 2020).

EXAMPLE 3

1. An example of a domestic bond is a bond issued by:
 - A. LG Group from South Korea, denominated in British pounds, and sold in the United Kingdom.
 - B. the UK Debt Management Office, denominated in British pounds, and sold in the United Kingdom.
 - C. Wal-Mart from the United States, denominated in US dollars, and sold in various countries in North America, Europe, the Middle East, and Asia Pacific.
2. A bond issued by Sony in Japan, denominated in US dollars but not registered with the SEC, and sold to an institutional investor in the Middle East, is *most likely* an example of a:
 - A. Eurobond.
 - B. global bond.
 - C. foreign bond.

Solution to 1: B is correct. A domestic bond is issued by a local issuer, denominated in local currency, and sold in the domestic market. Gilts are British pound-denominated bonds issued by the UK Debt Management Office in the United Kingdom. Thus, they are UK domestic bonds. A is incorrect because a bond issued by LG Group from South Korea, denominated in British pounds, and sold in the United Kingdom is an example of a foreign bond. C is incorrect because a bond issued by Wal-Mart from the United States, denominated in US dollars, and sold in various countries in North America, Europe, the Middle East, and Asia Pacific is most likely an example of a global bond, particularly if it is also sold in the Eurobond market.

Solution to 2: A is correct. A Eurobond is a bond that is issued internationally, outside the jurisdiction of any single country. Thus, a bond issued by Sony from Japan, denominated in US dollars but not registered with the SEC, is an example of a Eurobond. B is incorrect because global bonds are bonds that are issued simultaneously in the Eurobond market and in at least one domestic bond market. C is incorrect because if Sony's bond issue were a foreign bond, it would be registered with the SEC.

3.1. Tax Considerations

Bond interest is usually taxed at the ordinary income tax rate, which is typically the same tax rate that an individual would pay on wage or salary income. Tax-exempt securities are the exception to this rule. For example, interest income received by holders of local government bonds, called municipal bonds in the United States, is often exempt from federal income tax and from the income tax of the state in which the bonds are issued. The tax status of bond income may also depend on where the bond is issued and traded. For example, some domestic bonds pay their interest net of income tax. Other bonds, including some Eurobonds, make gross interest payments.

In addition to earnings from interest, a bond investment will generate a capital gain or loss if sold prior to maturity at a price different from the purchase price. This change will generate a capital gain if the bond price has increased or a capital loss if the bond price has decreased. Capital gains or losses usually face different tax treatment from taxable income, which often varies for long-term and short-term capital gains. For example, capital gains recognized over a year after the original bond purchase may be taxed at a lower long-term capital gains tax rate, whereas capital gains recognized within a year of bond purchase may be taxed as a short-term capital gain that equals the ordinary income tax rate. Exceptions exist, and not all countries have a separate capital gains tax. Differences in national and local tax legislation can add further complexity to aggregate country capital gains tax treatment.

For bonds issued at a discount, the tax status of the original issue discount is an additional tax consideration. The original issue discount is the difference between the par value and the original issue price. For example, the United States includes a prorated portion of the discount in interest income every tax year, while Japan does not. Original issue discount tax treatment varies by country, and Exhibit 3 illustrates the potential importance of this tax consideration.

EXHIBIT 3 Original Issue Discount Tax Provision

Assume a hypothetical country, Zinland, where the local currency is the zini (Z). The market interest rate in Zinland is 10%, and both interest income and capital gains are taxed. Companies A and B issue 20-year bonds with a par value of Z1,000. Company A issues a coupon bond with an annual coupon rate of 10%. Investors buy Company A's bonds for Z1,000. Every year, they receive and pay tax on their Z100 annual interest payments. When Company A's bonds mature, bondholders receive the par value of Z1,000. Company B issues a zero-coupon bond at a discount. Investors buy Company B's bonds for Z148.64. They do not receive any cash flows until Company B pays the par value of Z1,000 when the bonds mature.

Company A's bonds and Company B's bonds are economically identical in the sense that they have the same maturity (20 years) and the same yield to maturity (10%). Company A's bonds make periodic payments, however, whereas Company B's bonds defer payment until maturity. Investors in Company A's bonds must include the annual interest payments in taxable income. When they receive their original Z1,000 investment back at maturity, they face no capital gain or loss. Without an original issue discount tax provision, investors in Company B's bonds do not have any taxable income until the bonds mature. When they receive the par value at maturity, they face a capital gain on the original issue discount—that is, on Z851.36 ($Z1,000 - Z148.64$). The purpose of an original issue discount tax provision is to tax investors in Company B's bonds the same way as investors in Company A's bonds. Thus, a prorated portion of the Z851.36 original issue discount is included in taxable income every tax year until maturity. This allows investors in Company B's bonds to increase their cost basis in the bonds so that at maturity, they face no capital gain or loss.

Some jurisdictions also have tax provisions for bonds bought at a premium. They may allow investors to deduct a prorated portion of the amount paid in excess of the bond's par value from their taxable income every tax year until maturity. For example, if an investor pays \$1,005 for a bond that has a par value of \$1,000 and matures five years later, she can deduct \$1 from her taxable income every tax year for five years. This deduction may be a choice rather than a requirement, with an investor able to decide whether to deduct a prorated portion of the premium each year or to deduct nothing and declare a capital loss when the bond is redeemed at maturity.

EXAMPLE 4

1. The coupon payment is *most likely* to be taxed as:
 - A. ordinary income.
 - B. short-term capital gain.
 - C. long-term capital gain.
2. Assume that a company issues bonds in the hypothetical country of Zinland, where the local currency is the zini (Z). There is an original issue discount tax provision in Zinland's tax code. The company issues a 10-year zero-coupon bond with a par value of Z1,000 and sells it for Z800. An investor who buys the zero-coupon bond at issuance and holds it until maturity *most likely*:
 - A. has to include Z20 in his taxable income every tax year for 10 years and has to declare a capital gain of Z200 at maturity.
 - B. has to include Z20 in his taxable income every tax year for 10 years and does not have to declare a capital gain at maturity.
 - C. does not have to include anything in his taxable income every tax year for 10 years but has to declare a capital gain of Z200 at maturity.

Solution to 1: A is correct. Interest income is typically taxed at the ordinary income tax rate, which may be the same tax rate that individuals pay on wage and salary income.

Solution to 2: B is correct. The original issue discount tax provision requires the investor to include a prorated portion of the original issue discount in his taxable income every tax year until maturity. The original issue discount is the difference between the par value and the original issue price—that is, $Z1,000 - Z800 = Z200$. The bond's maturity is 10 years. Thus, the prorated portion that must be included each year is $Z200 \div 10 = Z20$. The original issue discount tax provision allows the investor to increase his cost basis in the bond so that when the bond matures, the investor faces no capital gain or loss.

4. PRINCIPAL REPAYMENT STRUCTURES

• describe how cash flows of fixed-income securities are structured

The most common payment structure by far is that of a plain vanilla bond, as depicted in Exhibit 1. These bonds make periodic, fixed coupon payments and a lump-sum payment of principal at maturity. But there are other structures regarding both the principal repayment and the interest payments. This section discusses the major schedules observed in the global fixed-income markets. Schedules for principal repayments and interest payments are typically similar for a particular type of bond, such as 30-year US Treasury bonds. However, payment schedules vary considerably between types of bonds, such as government bonds versus corporate bonds.

4.1. Principal Repayment Structures

How the amount borrowed is repaid is an important consideration for investors as it affects credit risk. Any provision that periodically retires some of the principal amount outstanding is a way to reduce credit risk.

4.1.1. Bullet, Fully Amortized, and Partially Amortized Bonds

The payment structure of a plain vanilla bond has been used for nearly every government bond ever issued as well as for most corporate bonds. Such a bond is also known as a **bullet bond** because the entire payment of principal occurs at maturity.

In contrast, an **amortizing bond** has a payment schedule that calls for periodic payments of interest and repayments of principal. A fully amortized bond is characterized by a fixed periodic payment schedule that reduces the bond's outstanding principal amount to zero by the maturity date. A partially amortized bond also makes fixed periodic payments until maturity, but only a portion of the principal is repaid by the maturity date. Thus, a **balloon payment** is required at maturity to retire the bond's outstanding principal amount.

Exhibit 4 illustrates the differences in the payment schedules for a bullet bond, a fully amortized bond, and a partially amortized bond. For the three bonds, the principal amount is \$1,000, the maturity is five years, the coupon rate is 6%, and interest payments are made annually. The market interest rate used to discount the bonds' expected cash flows until maturity is assumed to be constant at 6%. The bonds are issued and redeemed at par. For the partially amortized bond, the balloon payment is \$200 at maturity.

EXHIBIT 4 Example of Payment Schedules for Bullet, Fully Amortized, and Partially Amortized Bonds

Bullet Bond

Year	Investor Cash Flows	Interest Payment	Principal Repayment	Outstanding Principal at the End of the Year
0	−\$1,000.00			\$1,000.00
1	60.00	\$60.00	\$0.00	1,000.00
2	60.00	60.00	0.00	1,000.00
3	60.00	60.00	0.00	1,000.00
4	60.00	60.00	0.00	1,000.00
5	1,060.00	60.00	1,000.00	0.00

Fully Amortized Bond

Year	Investor Cash Flows	Interest Payment	Principal Repayment	Outstanding Principal at the End of the Year
0	−\$1,000.00			
1	237.40	\$60.00	\$177.40	\$822.60
2	237.40	49.36	188.04	634.56
3	237.40	38.07	199.32	435.24
4	237.40	26.11	211.28	223.96
5	237.40	13.44	223.96	0.00

Partially Amortized Bond

Year	Investor Cash Flows	Interest Payment	Principal Repayment	Outstanding Principal at the End of the Year
0	−\$1,000.00			
1	201.92	\$60.00	\$141.92	\$858.08
2	201.92	51.48	150.43	707.65
3	201.92	42.46	159.46	548.19
4	201.92	32.89	169.03	379.17
5	401.92	22.75	379.17	0.00

Investors pay \$1,000 now to purchase any of the three bonds. For the bullet bond, they receive the coupon payment of \$60 ($6\% \times \$1,000$) every year for five years. The last payment is \$1,060 because it includes both the last coupon payment and the principal amount.

For the fully amortized bond, the annual payment, which includes both the coupon payment and the principal repayment, is constant. Thus, this annual payment can be viewed as an annuity. This annuity lasts for five years; its present value, discounted at the market interest rate of 6%, is equal to the bond price of \$1,000. Therefore, the annual payment is \$237.40. The first year, the interest part of the payment is \$60 ($6\% \times \$1,000$), which implies that the principal repayment part is \$177.40 ($\$237.40 - \60). This repayment leaves an outstanding principal amount, which becomes the basis for the calculation of the interest the following year, of \$822.60 ($\$1,000 - \177.40). The second year, the interest part of the payment is \$49.36 ($6\% \times \822.60), the principal repayment part is \$188.04 ($\$237.40 - \49.36), and the outstanding principal amount is \$634.56 ($\$822.60 - \188.04). The fifth year, the outstanding principal amount is fully repaid. Note that the annual payment is constant, but over time the interest payment decreases while the principal repayment increases.

The partially amortized bond can be viewed as the combination of two elements: a five-year annuity plus the balloon payment at maturity. The sum of the present values of these two elements is equal to the bond price of \$1,000. As for the fully amortized bond, the discount rate is the market interest rate of 6%, making the constant amount for the annuity \$201.92. This amount represents the annual payment for the first four years. For Years 1 through 4, the split between interest and principal is done the same way as for the fully amortized bond. The interest part of the payment is equal to 6% multiplied by the outstanding principal at the end of the previous year; the principal repayment part is equal to \$201.92 minus the interest part of the payment for the year; and the outstanding principal amount at the end of the year is equal to the outstanding principal amount at the end of the previous year minus the principal repayment for the year. In Year 5, investors receive \$401.92; this amount is calculated either as the sum of the interest payment (\$22.75) and the outstanding principal amount (\$379.17) or as the constant amount of the annuity (\$201.92) plus the balloon payment (\$200). As for the fully amortized bond, the interest payment decreases and the principal repayment increases over time. Because the principal amount is not fully amortized, interest payments are higher for the partially amortized bond than for the fully amortized bond, except the first year when they are equal.

Exhibit 4 does not address the complexity of the repayment structure for some bonds, such as many ABS. For example, MBS face prepayment risk, which is the possible early repayment of mortgage principal. Borrowers usually have the right to prepay mortgages, which typically occurs when a current homeowner purchases a new home or when homeowners refinance their mortgages because market interest rates have fallen.

EXAMPLE 5

1. The structure that requires the largest repayment of principal at maturity is that of a:
 - A. bullet bond.
 - B. fully amortized bond.
 - C. partially amortized bond.

2. A plain vanilla bond has a maturity of 10 years, a par value of £100, and a coupon rate of 9%. Interest payments are made annually. The market interest rate is assumed to be constant at 9%. The bond is issued and redeemed at par. The principal repayment the first year is *closest* to:
 - A. £0.00.
 - B. £6.58.
 - C. £10.00.
3. Relative to a fully amortized bond, the coupon payments of an otherwise similar partially amortized bond are:
 - A. lower or equal.
 - B. equal.
 - C. higher or equal.

Solution to 1: A is correct. The entire repayment of principal occurs at maturity for a bullet (or plain vanilla) bond, whereas it occurs over time for fully and partially amortized bonds. Thus, the largest repayment of principal at maturity is that of a bullet bond.

Solution to 2: A is correct. A plain vanilla (or bullet) bond does not make any principal repayment until the maturity date. B is incorrect because £6.58 would be the principal repayment for a fully amortized bond.

Solution to 3: C is correct. Except at maturity, the principal repayments are lower for a partially amortized bond than for an otherwise similar fully amortized bond. Consequently, the principal amounts outstanding—and, therefore, the amounts of interest payments—are higher for a partially amortized bond than for a fully amortized bond, all else equal. The only exception is the first interest payment, which is the same for both repayment structures. This is because no principal repayment has been made by the time the first coupon is paid.

4.1.2. Sinking Fund Arrangements

A **sinking fund arrangement** is another approach that can be used to achieve the same goal of periodically retiring the bond's principal outstanding. The term sinking fund refers to an issuer's plans to set aside funds over time to retire the bond. Originally, a sinking fund was a specified cash reserve that was segregated from the rest of the issuer's business for the purpose of repaying the principal. More generally today, a sinking fund arrangement specifies the portion of the bond's principal outstanding, perhaps 5%, that must be repaid each year throughout the bond's life or after a specified date. This repayment occurs whether or not an actual segregated cash reserve has been created.

Typically, the issuer will forward repayment proceeds to the bond's trustee. The trustee will then either redeem bonds to this value or select by lottery the serial numbers of bonds to be paid off. The bonds for repayment may be listed in business newspapers, such as the *Wall Street Journal* or the *Financial Times*.

Another type of sinking fund arrangement operates by redeeming a steadily increasing amount of the bond's notional principal (total amount) each year. Any remaining principal is then redeemed at maturity. It is common to find utility and energy companies in the

United States, the United Kingdom, and the Commonwealth countries that issue bonds with sinking fund arrangements that incorporate such a provision.

Another common variation is for the bond issue to include a call provision, which gives the issuer the option to repurchase the bonds before maturity. The issuer can usually repurchase the bonds at the market price, at par, or at a specified sinking fund price, whichever is the lowest. To allocate the burden of the call provision fairly among bondholders, the bonds to be retired are selected at random based on serial number. Usually, the issuer can repurchase only a small portion of the bond issue. Some indentures, however, allow issuers to use a doubling option to repurchase double the required number of bonds.

Sinking fund arrangements have several benefits and drawbacks. The benefits include a structure that ensures a formal plan exists for debt retirement and also reduces credit risk due to a reduction of default risk at maturity. Sinking fund drawbacks include investor reinvestment risk, which is the risk associated with having to reinvest cash flows at an interest rate below the current yield-to-maturity. If the serial number of an investor's bonds is selected, the bonds will be repaid and the investor will have to reinvest the proceeds. If market interest rates have fallen since the investor purchased the bonds, the investor probably will not be able to purchase a bond offering the same return. Another potential disadvantage for investors occurs if the issuer has the option to repurchase bonds at below market prices. For example, an issuer could exercise a call option to buy back bonds at par on bonds priced above par. In this case, investors would suffer a loss.

Exhibit 5 illustrates an example of a sinking fund arrangement.

EXHIBIT 5 Example of a Sinking Fund Arrangement

The notional principal of the bond issue is £200 million. The sinking fund arrangement calls for 5% of the outstanding principal amount to be retired in Years 10 through 19, with the outstanding balance paid off at maturity in 20 years.

Year	Outstanding Principal at the Beginning of the Year (£ millions)	Sinking Fund Payment (£ millions)	Outstanding Principal at the End of the Year (£ millions)	Final Principal Repayment (£ millions)
0			200.00	
1 to 9	200.00	0.00	200.00	
10	200.00	10.00	190.00	
11	190.00	9.50	180.50	
12	180.50	9.03	171.48	
13	171.48	8.57	162.90	
14	162.90	8.15	154.76	
15	154.76	7.74	147.02	
16	147.02	7.35	139.67	
17	139.67	6.98	132.68	
18	132.68	6.63	126.05	
19	126.05	6.30	119.75	
20	119.75			119.75

EXHIBIT 5 (Continued)

There is no repayment of the principal during the first nine years. Starting the 10th year, the sinking fund arrangement calls for 5% of the outstanding principal amount to be retired each year. In Year 10, £10 million ($5\% \times £200$ million) are paid off, which leaves an outstanding principal balance of £190 million. In Year 11, the principal amount repaid is £9.50 million ($5\% \times £190$ million). The final repayment of the remaining balance (£119.75 million) is a balloon payment at maturity.

5. COUPON PAYMENT STRUCTURES

- **describe how cash flows of fixed-income securities are structured**

A coupon is the interest payment that the bond issuer makes to the bondholder. A conventional bond pays a fixed periodic coupon over a specified time to maturity. Most frequently, the coupon is paid semi-annually for sovereign and corporate bonds; this is the case in the United States, the United Kingdom, and such Commonwealth countries as Bangladesh, India, and New Zealand. Eurobonds usually pay an annual coupon, although some Eurobonds make quarterly coupon payments. Most bonds issued in the eurozone have an annual coupon.

Fixed-rate coupons are not the only coupon payment structure, however. A wide range of coupon types is offered in the global fixed-income markets to meet the differing needs of both issuers and investors.

5.1. Floating-Rate Notes

Floating-rate notes do not have a fixed coupon; instead, their coupon rate is linked to an external reference rate, such as Euribor. Thus, an FRN's interest rate will fluctuate periodically during the bond's life, following the changes in the reference rate. Therefore, the FRN's cash flows are not known with certainty. Large issuers of FRNs include government-sponsored enterprises (GSEs), such as the Federal Home Loan Banks (FHLB), the Federal National Mortgage Association ("Fannie Mae"), and the Federal Home Loan Mortgage Corporation ("Freddie Mac") in the United States, as well as banks and financial institutions in Europe and Asia Pacific. It is rare for national governments to issue FRNs because investors in sovereign bonds generally prefer fixed coupon bonds.

Almost all FRNs have quarterly coupons, although counterexamples do exist. FRNs usually pay a fixed spread over the specified reference rate. A typical coupon rate may be the three-month US dollar MRR + 20 bps (i.e., $MRR + 0.20\%$) for a US dollar-denominated bond or the three-month Euribor + 20 bps for a euro-denominated FRN.

Contrary to plain vanilla, which are fixed-rate securities that decline in value in a rising interest rate environment, FRNs are less affected when interest rates increase because their coupon rates vary with market interest rates and are reset at regular, short-term intervals. Thus, FRNs have little interest rate risk—that is, the risk that a change in market interest rate affects a bond's value. FRNs are frequently favored by investors who expect that interest rates will rise. That said, investors still face credit risk when investing in FRNs. If an issuer's credit risk does not change from one coupon reset date to the next, the FRN's price generally will stay close to the par value. However, if there is a change in the issuer's credit quality that affects the perceived credit risk associated with the bond, the price of the FRN will deviate from its par value. A higher level of credit risk will lead to a lower price.

Additional features observed in FRNs may include a floor or a cap. A floor (floored FRN) prevents the coupon from falling below a specified minimum rate. This feature benefits the

bondholders, who are guaranteed that the interest rate will not fall below the specified rate during a time of falling interest rates. In contrast, a cap (capped FRN) prevents the coupon from rising above a specified maximum rate. This feature benefits the issuer because it sets a limit to the interest rate paid on the debt during a time of rising interest rates. It is also possible to have a collared FRN, which includes both a cap and a floor.

An inverse or reverse FRN, or simply an inverse floater, is a bond whose coupon rate has an inverse relationship to the reference rate. The basic structure is the same as an ordinary FRN except for the direction in which the coupon rate is adjusted. When interest rates fall, the coupon rate on an ordinary FRN decreases; in contrast, the coupon rate on a reverse FRN increases. Thus, inverse FRNs are typically favored by investors who expect interest rates to decline.

5.2. Step-Up Coupon Bonds

The coupon of a **step-up coupon bond**, which may be fixed or floating, increases by specified margins at specified dates. An example of a bond with a step-up coupon is a ten-year callable bond issued by the Federal Home Loan Bank on 3 August 2016. The initial coupon rate was 1.25% and steps up to 1.50% on 3 August 2018, to 2.00% on 3 August 2020, to 2.50% on 3 August 2022, to 3.00% on 3 August 2023, to 4.00% on 3 August 2024, and finally to 6.00% on 3 August 2025 for the final year. The bond was first callable at par on 3 August 2018, at the time of the first step up.

Bonds with step-up coupons offer bondholders some protection against rising interest rates, and they may be an important feature for callable bonds. When interest rates increase, there is a higher likelihood that the issuer will not call the bonds, particularly if the bonds have a fixed rate of interest. The step-up coupon allows bondholders to receive a higher coupon, in line with the higher market interest rates. Alternatively, when interest rates decrease or remain stable, the step-up feature acts as an incentive for the issuer to call the bond before the coupon rate increases and the interest expense rises.

Redeeming the bond when the coupon increases is not automatic, however; the issuer may choose to keep the bond despite its increasing cost. This may happen if refinancing the bond is necessary and alternatives are less advantageous for this issuer. For example, a financial crisis may make it difficult for the issuer to refinance. Alternatively, the issuer's credit quality may have deteriorated, which would lead to a higher yield, potentially making the coupon rate on the new bond more expensive than that on the existing bond despite the stepped-up coupon. Although the issuer does not have to call the bond, there is an implicit expectation from investors that it will do so if the market price for the bond is above the call price. Failure to do so may be viewed negatively by market participants and reduce investors' appetite for that issuer's bonds in the future.

5.3. Credit-Linked Coupon Bonds

A **credit-linked coupon bond** has a coupon that changes when the bond's credit rating changes. An example of a bond with a credit-linked coupon is one of British Telecom's bonds maturing in 2030. It was issued with a coupon rate of 8.625%, with a 25 bp increase in coupon for each credit rating downgrade below the bond's credit rating at the time of issuance and a 25 bp decrease for every credit rating upgrade above the bond's credit rating at the time of issuance.

Bonds with credit-linked coupons are attractive to investors who are concerned about the future creditworthiness of the issuer. They may also provide some general protection against a poor economy because credit ratings tend to decline the most during recessions. A potential problem associated with these bonds is that increases in the coupon payments resulting from a

downgrade may ultimately result in further deteriorations of the credit rating or even contribute to the issuer's default.

5.4. Payment-in-Kind Coupon Bonds

A payment-in-kind (PIK) coupon bond typically allows the issuer to pay interest in the form of additional amounts of the bond issue rather than as a cash payment. Such bonds are favored by issuers who are concerned that the issuer may face potential cash flow problems in the future. They are used, for example, in financing companies that have a high debt burden, such as companies going through a leveraged buyout (a form of acquisition in which the financing consists primarily of debt). Investors usually demand a higher yield for holding bonds with PIK coupons in exchange for assuming their additional credit risk.

Other forms of PIK arrangements can also be found, such as paying the bondholders with common shares worth the amount of coupon due. With a PIK “toggle” note, the borrower has the option, for each interest period, to pay interest in cash, to make the interest payment in kind, or some mix of the two. Cash payments or payments in kind are frequently at the discretion of the borrower, but whether the payment is made in cash or in kind can be determined by an earnings or cash flow trigger identified in the indenture.

5.5. Deferred Coupon Bonds

A **deferred coupon bond**, sometimes called a **split coupon bond**, pays no coupons for its first few years but then pays a higher coupon than it otherwise normally would for the remainder of its life. Issuers of deferred coupon bonds are usually seeking ways to conserve cash in the years immediately following the bond issue, which may indicate poorer credit quality. Deferred coupon bonds are also common in project financing when the assets being developed do not generate any income during the development phase. A deferred coupon bond allows the issuer to delay interest payments until the project is completed, and the cash flows generated by the assets being financed can be used to service the debt.

One of the main advantages of investing in a deferred coupon bond is that these bonds are typically priced at significant discounts to par. Investors may also find the deferred coupon structure to be very helpful in managing taxes. If taxes due on the interest income can be delayed, investors may be able to minimize taxes. This tax advantage, however, depends on the jurisdiction concerned and how its tax rules apply to deferred coupon payments.

A zero-coupon bond can be thought of as an extreme form of deferred coupon bond. These securities pay no interest to the investor and thus are issued at a deep discount to par value. At maturity, the bondholder receives the par value of the bond as payment. Effectively, a zero-coupon bond defers all interest payments until maturity.

5.6. Index-Linked Bonds

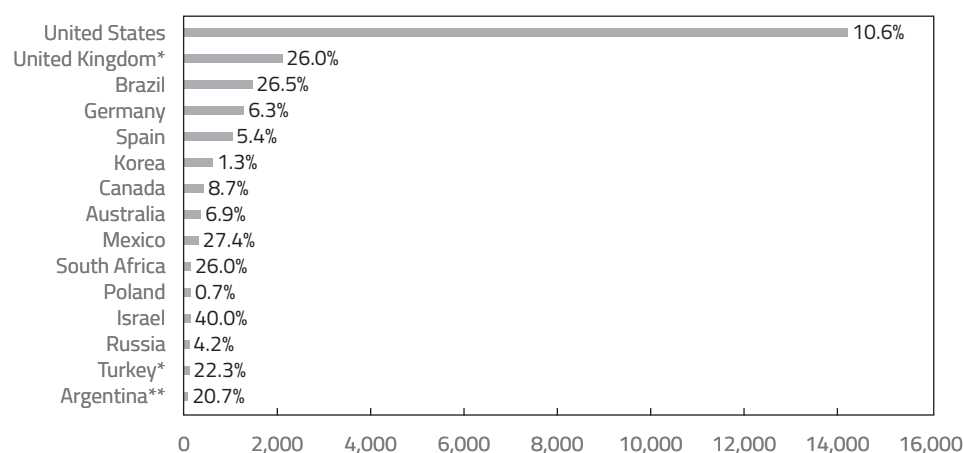
An **index-linked bond** has its coupon payments and/or principal repayment linked to a specified index. In theory, a bond can be indexed to any published variable, including an index reflecting prices, earnings, economic output, commodities, or foreign currencies. **Inflation-linked bonds** are an example of index-linked bonds. They offer investors protection against inflation by linking a bond's coupon payments and/or the principal repayment to an index of consumer prices, such as the UK Retail Price Index (RPI) or the US Consumer Price Index (CPI). The advantage of using the RPI or CPI is that these indexes are well-known, transparent, and published regularly.

Governments are large issuers of inflation-linked bonds, also called **linkers**. The United Kingdom was one of the first developed countries to issue inflation-linked bonds in 1981, offering gilts linked to the UK RPI, its main measure of the rate of inflation. In 1997, the US Treasury introduced Treasury Inflation-Protected Securities (TIPS) linked to the US Consumer Price Index (CPI). Inflation-linked bonds are now more frequently being offered by corporate issuers, including both financial and non-financial companies.

A bond's stated coupon rate represents the nominal interest rate received by the bondholders. But inflation reduces the actual value of the interest received. The interest rate that bondholders actually receive, net of inflation, is the real interest rate; it is approximately equal to the nominal interest rate minus the rate of inflation. By increasing the coupon payments and/or the principal repayment in line with increases in the price index, inflation-linked bonds reduce inflation risk. An example of an inflation-linked bond is the 1% US TIPS that matures on 15 February 2048. The coupon rate remains fixed at 1%, but the principal is adjusted every six months for changes in the CPI.

Exhibit 6 shows some of the national governments that have issued large amounts of inflation-linked bonds. It displays the amount of the linkers and the percentage of the total debt for each country. Sovereign issuers can be grouped into three categories. The first category includes such countries as Brazil and Argentina, who have issued inflation-linked bonds because they were experiencing extremely high rates of inflation when borrowing. Thus, offering inflation-linked bonds was their only available alternative to raise funds. The second category includes the United Kingdom and Australia. These countries have issued inflation-linked bonds to not only add credibility to the government's commitment to disinflationary policies but also to capitalize on investor demand. The third category, which includes the United States, Canada, and Germany, consists of national governments that are most concerned about the social welfare benefits associated with inflation-linked securities. Theoretically, inflation-linked bonds provide investors the benefit of a long-term asset with a fixed real return that is free from inflation risk.

EXHIBIT 6 Government Inflation-Linked Debt in Billions of USD as of Q4 2019 and the Percentage of Total Debt



* Denotes latest data from 2017.

** Denotes latest data from 2018.

Source: Based on data from the Bank for International Settlements, Table C2, available at www.bis.org/statistics/secstats.htm (updated 3 June 2020).

Different methods have been used for linking the cash flows of an index-linked bond to a specified index; the link can be made via the interest payments, the principal repayment, or both. The following examples describe how the link between the cash flows and the index is established, using inflation-linked bonds as an illustration.

- *Zero-coupon-indexed bonds* pay no coupon, so the inflation adjustment is made via the principal repayment only: The principal amount to be repaid at maturity increases in line with increases in the price index during the bond's life. This type of bond has been issued in Sweden.
- *Interest-indexed bonds* pay a fixed nominal principal amount at maturity but an index-linked coupon during the bond's life. Thus, the inflation adjustment applies to the interest payments only. This is essentially a floating-rate note in which the reference rate is the inflation rate instead of an MRR, such as Euribor. These have been issued by insurance companies and major commercial banks but not typically by governments.
- *Capital-indexed bonds* pay a fixed coupon rate, but it is applied to a principal amount that increases in line with increases in the index during the bond's life. Thus, both the interest payments and the principal repayment are adjusted for inflation. Such bonds have been issued by governments in Australia, Canada, New Zealand, the United Kingdom, and the United States.
- *Indexed-annuity bonds* are fully amortized bonds, in contrast to interest-indexed and capital-indexed bonds that are non-amortizing coupon bonds. The annuity payment, which includes both payment of interest and repayment of the principal, increases in line with inflation during the bond's life. Indexed-annuity bonds linked to a price index have been issued by local governments in Australia but not by the national government.

Exhibit 7 illustrates the different methods used for inflation-linked bonds.

EXHIBIT 7 Examples of Inflation-Linked Bonds

Assume a hypothetical country, Lemuria, where the currency is the lemming (L). The country issued 20-year bonds linked to the domestic Consumer Price Index (CPI). The bonds have a par value of L1,000. Lemuria's economy has been free of inflation until the most recent six months, when the CPI increased by 5%.

Suppose that the bonds are zero-coupon-indexed bonds. There will never be any coupon payments. Following the 5% increase in the CPI, the principal amount to be repaid increases to L1,050 [$L1,000 \times (1 + 0.05)$] and will continue increasing in line with inflation until maturity.

Now, suppose that the bonds are coupon bonds that make semi-annual interest payments based on an annual coupon rate of 4%. If the bonds are interest-indexed bonds, the principal amount at maturity will remain L1,000 regardless of the CPI level during the bond's life and at maturity. The coupon payments, however, will be adjusted for inflation. Prior to the increase in inflation, the semi-annual coupon payment was L20 [$(0.04 \times L1,000) \div 2$]. Following the 5% increase in the CPI, the semi-annual coupon payment increases to L21 [$L20 \times (1 + 0.05)$]. Future coupon payments will also be adjusted for inflation.

If the bonds are capital-indexed bonds, the annual coupon rate remains 4%, but the principal amount is adjusted for inflation and the coupon payment is based on the inflation-adjusted principal amount. Following the 5% increase in the CPI, the inflation-adjusted principal amount increases to L1,050 [$L1,000 \times (1 + 0.05)$], and the new semi-annual coupon payment is L21 [$(0.04 \times L1,050) \div 2$]. The principal amount will continue increasing in line with increases in the CPI until maturity, and so will the coupon payments.

(continued)

EXHIBIT 7 (Continued)

If the bonds are indexed-annuity bonds, they are fully amortized. Prior to the increase in inflation, the semi-annual payment was L36.56—the annuity payment based on a principal amount of L1,000 paid back in 40 semi-annual payments with an annual discount rate of 4%. Following the 5% increase in the CPI, the annuity payment increases to L38.38 [$L36.56 \times (1 + 0.05)$]. Future annuity payments will also be adjusted for inflation in a similar manner.

EXAMPLE 6

1. Floating-rate notes *most likely* pay:
 - A. annual coupons.
 - B. quarterly coupons.
 - C. semi-annual coupons.
2. A zero-coupon bond can *best* be considered a:
 - A. step-up bond.
 - B. credit-linked bond.
 - C. deferred coupon bond.
3. The bonds that do **not** offer protection to the investor against increases in market interest rates are:
 - A. step-up bonds.
 - B. floating-rate notes.
 - C. inverse floating-rate notes.
4. The US Treasury offers Treasury Inflation-Protected Securities (TIPS). The principal of TIPS increases with inflation and decreases with deflation based on changes in the US Consumer Price Index. When TIPS mature, an investor is paid the original principal or inflation-adjusted principal, whichever is greater. TIPS pay interest twice a year based on a fixed real coupon rate that is applied to the inflation-adjusted principal. TIPS are *most likely*:
 - A. capital-indexed bonds.
 - B. interest-indexed bonds.
 - C. indexed-annuity bonds.
5. Assume a hypothetical country, Lemuria, where the national government has issued 20-year capital-indexed bonds linked to the domestic Consumer Price Index (CPI). Lemuria's economy has been free of inflation until the most recent six months, when the CPI increased. Following the increase in inflation:
 - A. the principal amount remains unchanged but the coupon rate increases.
 - B. the coupon rate remains unchanged, but the principal amount increases.
 - C. the coupon payment remains unchanged, but the principal amount increases.

Solution to 1: B is correct. Most FRNs pay interest quarterly and are tied to a three-month MRR.

Solution to 2: C is correct. Because interest is effectively deferred until maturity, a zero-coupon bond can be thought of as a deferred coupon bond. A and B are incorrect

because both step-up bonds and credit-linked bonds pay regular coupons. For a step-up bond, the coupon increases by specified margins at specified dates. For a credit-linked bond, the coupon changes when the bond's credit rating changes.

Solution to 3: C is correct. The coupon rate on an inverse FRN has an inverse relationship to the market reference rate. Thus, an inverse FRN does not offer protection to the investor when market interest rates increase but rather when they decrease. A and B are incorrect because step-up bonds and FRNs both offer protection against increases in market interest rates.

Solution to 4: A is correct. TIPS have a fixed coupon rate, and the principal is adjusted based on changes in the CPI. Thus, TIPS are an example of capital-indexed bonds. B is incorrect because with an interest-indexed bond, it is the principal repayment at maturity that is fixed and the coupon that is linked to an index. C is incorrect because indexed-annuity bonds are fully amortized bonds, not bullet bonds. The annuity payment (interest payment and principal repayment) is adjusted based on changes in an index.

Solution to 5: B is correct. Following an increase in inflation, the coupon rate of a capital-indexed bond remains unchanged, but the principal amount is adjusted upward for inflation. Thus, the coupon payment, which is equal to the fixed coupon rate multiplied by the inflation-adjusted principal amount, increases.

6. CALLABLE AND PUTABLE BONDS

- **describe contingency provisions affecting the timing and/or nature of cash flows of fixed-income securities and whether such provisions benefit the borrower or the lender**

A contingency refers to some future event or circumstance that is possible but not certain. A **contingency provision** is a clause in a legal document that allows for some action if the event or circumstance does occur. For bonds, the term **embedded option** refers to various contingency provisions found in the indenture. These contingency provisions provide the issuer or the bondholders the right, but not the obligation, to take some action. These rights are called "options." These options are not independent of the bond and cannot be traded separately—hence the term "embedded." Some common types of bonds with embedded options include callable bonds, putable bonds, and convertible bonds. The options embedded in these bonds grant either the issuer or the bondholders certain rights affecting the disposal or redemption of the bond.

6.1. Callable Bonds

The most widely used embedded option is the call provision. A **callable bond** gives the issuer the right to redeem all or part of the bond before the specified maturity date. The primary reason why issuers choose to issue callable bonds rather than non-callable bonds is to protect themselves against a decline in interest rates. This decline can come either from market interest rates falling or from the issuer's credit quality improving. If market interest rates fall or credit quality improves, the issuer of a callable bond has the right to replace an old, expensive

bond issue with a new, cheaper bond issue. In other words, the issuer can benefit from a decline in interest rates by being able to refinance its debt at a lower interest rate. For example, assume that the market interest rate was 6% at the time of issuance and that a company issued a bond with a coupon rate of 7%—the market interest rate plus a spread of 100 bps. Now assume that the market interest rate has fallen to 4% and that the company's creditworthiness has not changed; it can still issue at the market interest rate plus 100 bps. If the original bond is callable, the company can redeem it and replace it with a new bond paying 5% annually. If the original bond is non-callable, the company must carry on paying 7% annually and cannot benefit from the decline in market interest rates.

As illustrated in this example, callable bonds are advantageous to the issuer of the security. Put another way, the call option has value to the *issuer*. Callable bonds present investors with a higher level of reinvestment risk than non-callable bonds; that is, if the bonds are called, bondholders must reinvest funds in a lower interest rate environment. For this reason, callable bonds have to offer a higher yield and sell at a lower price than otherwise similar non-callable bonds. The higher yield and lower price compensate the bondholders for the value of the call option to the issuer.

Callable bonds have a long tradition and are commonly issued by corporate issuers. Although first issued in the US market, they are now frequently issued in every major bond market and in a variety of forms.

The details about the call provision are specified in the indenture. These details include the call price, which represents the price paid to bondholders when the bond is called. The call premium is the amount over par paid by the issuer if the bond is called. There may be restrictions on when the bond can be called, or the bond may have different call prices depending on when it is called. The call schedule specifies the dates and prices at which a bond may be called. Some callable bonds are issued with a *call protection period*, also called lockout period, cushion, or deferment period. The call protection period prohibits the issuer from calling a bond early in its life and is often added as an incentive for investors to buy the bond. The earliest time that a bond might be called is known as the call date.

Make-whole calls first appeared in the US corporate bond market in the mid-1990s and have become more commonplace ever since. A typical make-whole call requires the issuer to make a lump-sum payment to the bondholders based on the present value of the future coupon payments and outstanding principal due to early bond redemption. The discount rate used is usually a pre-determined spread over the yield-to-maturity of an appropriate sovereign bond. The typical result is a redemption value that is significantly greater than the bond's current market price. A make-whole call provision is less detrimental to bondholders than a regular call provision because it allows them to be compensated if the issuer calls the bond. Issuers, however, rarely invoke this provision because redeeming a bond that includes a make-whole provision before the maturity date is costly. Issuers tend to include a make-whole provision as a "sweetener" to make the bond issue more attractive to potential buyers and allow them to pay a lower coupon rate.

Available exercise styles on callable bonds include the following:

- *American-style* call, sometimes referred to as continuously callable, for which the issuer has the right to call a bond at any time starting on the first call date.
- *European-style* call, for which the issuer has the right to call a bond only once on the call date.
- *Bermuda-style* call, for which the issuer has the right to call bonds on specified dates following the call protection period. These dates frequently correspond to coupon payment dates.

EXAMPLE 7

Assume a hypothetical 30-year bond is issued on 15 August 2019 at a price of 98.195 (as a percentage of par). Each bond has a par value of \$1,000. The bond is callable in whole or in part every 15 August from 2029 at the option of the issuer. The call prices are shown below.

Year	Call Price	Year	Call Price
2029	103.870	2035	101.548
2030	103.485	2036	101.161
2031	103.000	2037	100.774
2032	102.709	2038	100.387
2033	102.322	2039 and thereafter	100.000
2034	101.955		

- The call protection period is:
 - 10 years.
 - 11 years.
 - 20 years.
- The call premium (per \$1,000 in par value) in 2033 is *closest* to:
 - \$2.32.
 - \$23.22.
 - \$45.14.
- The call provision is *most likely*:
 - a Bermuda call.
 - a European call.
 - an American call.

Solution to 1: A is correct. The bonds were issued in 2019 and are first callable in 2029. The call protection period is $2029 - 2019 = 10$ years.

Solution to 2: B is correct. The call prices are stated as a percentage of par. The call price in 2033 is \$1,023.22 ($102.322\% \times \$1,000$). The call premium is the amount paid above par by the issuer. The call premium in 2033 is \$23.22 ($\$1,023.22 - \$1,000$).

Solution to 3: A is correct. The bond is callable every 15 August from 2029—that is, on specified dates following the call protection period. Thus, the embedded option is a Bermuda call.

6.2. Puttable Bonds

A put provision gives the bondholders the right to sell the bond back to the issuer at a pre-determined price on specified dates. **Puttable bonds** are beneficial for the bondholder by guaranteeing a pre-specified selling price at the redemption dates. If interest rates rise after issuance

and bond prices fall, the bondholders can put the bond back to the issuer and reinvest the proceeds in bonds that offer higher yields, in line with higher market interest rates.

Because a put provision has value to the *bondholders*, the price of a puttable bond will be higher than the price of an otherwise similar bond issued without the put provision. Similarly, the yield on a bond with a put provision will be lower than the yield on an otherwise similar non-puttable bond. The lower yield compensates the issuer for the value of the put option to the investor.

The indenture lists the redemption dates and the prices applicable to the sale of the bond back to the issuer. The selling price is usually the par value of the bond. Depending on the terms set out in the indenture, puttable bonds may allow buyers to force a sellback only once or multiple times during the bond's life. Puttable bonds that incorporate a single sellback opportunity include a European-style put and are often referred to as one-time put bonds. Puttable bonds that allow multiple sellback opportunities include a Bermuda-style put and are known as multiple put bonds. Multiple put bonds offer more flexibility for investors, so they are generally more expensive than one-time put bonds.

Typically, puttable bonds incorporate one- to five-year put provisions. Their increasing popularity has often been motivated by investors wanting to protect themselves against major declines in bond prices. One benefit of this rising popularity has been an improvement in liquidity in some markets, because the put protection attracts more conservative classes of investors. The global financial crisis that started in 2008 showed that these securities can often exacerbate liquidity problems, however, because they provide a first claim on the issuer's assets. The put provision gives bondholders the opportunity to convert their claim into cash before other creditors.

7. CONVERTIBLE BONDS

- **describe contingency provisions affecting the timing and/or nature of cash flows of fixed-income securities and whether such provisions benefit the borrower or the lender**

A **convertible bond** is a hybrid security with both debt and equity features. It gives the bondholder the right to exchange the bond for a specified number of common shares in the issuing company. Thus, a convertible bond can be viewed as the combination of a straight bond (option-free bond) plus an embedded equity call option. Convertible bonds can also include additional provisions, the most common being a call provision.

From the investor's perspective, a convertible bond offers several advantages relative to a non-convertible bond. First, it gives the bondholder the ability to convert into equity in case of share price appreciation, and thus participate in the equity upside. At the same time, the bondholder receives downside protection; if the share price does not appreciate, the convertible bond offers the comfort of regular coupon payments and the promise of principal repayment at maturity. Even if the share price and thus the value of the equity call option decline, the price of a convertible bond cannot fall below the price of the straight bond. Consequently, the value of the straight bond acts as a floor for the price of the convertible bond.

Because the conversion provision is valuable to *bondholders*, the price of a convertible bond is higher than the price of an otherwise similar bond without the conversion provision. Similarly, the yield on a convertible bond is lower than the yield on an otherwise similar non-convertible bond. However, most convertible bonds offer investors a yield advantage; the coupon rate on the convertible bond is typically higher than the dividend yield on the underlying common share.

From the issuer's perspective, convertible bonds offer two main advantages. The first is reduced interest expense. Issuers are usually able to offer below-market coupon rates due to the

conversion feature's value. The second advantage is the elimination of debt if the conversion option is exercised, but this is dilutive to existing shareholders.

Key terms regarding the conversion provision include the following:

- The **conversion price** is the price per share at which the convertible bond can be converted into shares.
- The **conversion ratio** is the number of common shares that each bond can be converted into. The indenture sometimes does not stipulate the conversion ratio but only mentions the conversion price. The conversion ratio is equal to the par value divided by the conversion price. For example, if the par value is €1,000 and the conversion price is €20, the conversion ratio is $€1,000 \div €20 = 50:1$, or 50 common shares per bond.
- The **conversion value**, sometimes called the parity value, is the current share price multiplied by the conversion ratio. For example, if the current share price is €33 and the conversion ratio is 30:1, the conversion value is $€33 \times 30 = €990$.
- The **conversion premium** is the difference between the convertible bond's price and its conversion value. For example, if the convertible bond's price is €1,020 and the conversion value is €990, the conversion premium is $€1,020 - €990 = €30$.
- Conversion parity occurs if the conversion value is equal to the convertible bond's price. Using the previous two examples, if the current share price is €34 instead of €33, then both the convertible bond's price and the conversion value are equal to €1,020 (i.e., a conversion premium equal to 0). This condition is referred to as parity. If the common share is selling for less than €34, the condition is below parity. In contrast, if the common share is selling for more than €34, the condition is above parity.

Generally, convertible bonds have maturities of five to ten years. First-time or newer issuers are usually able to issue convertible bonds of up to three years in maturity only. Although it is common for convertible bonds to reach conversion parity before maturity, bondholders rarely exercise the conversion option before that time. Early conversion would eliminate the yield advantage of continuing to hold the convertible bond; investors would typically receive in dividends less than they would receive in coupon payments. For this reason, it is common to find convertible bonds that are also callable by the issuer on a set of specified dates. If the convertible bond includes a call provision and the conversion value is above the convertible bond price, the issuer may force the bondholders to convert their bonds into common shares before maturity. For this reason, callable convertible bonds have to offer a higher yield and sell at a lower price than otherwise similar non-callable convertible bonds. Some indentures specify that the bonds can be called only if the share price exceeds a specified price, giving investors more predictability about the share price at which the issuer may force conversion.

A **warrant** is an "attached" rather than embedded option entitling the holder to buy the underlying stock of the issuing company at a fixed exercise price until the expiration date. Warrants are considered yield enhancements; they are frequently attached to bond issues as a "sweetener." Warrants are actively traded in some financial markets, such as the Deutsche Börse and the Hong Kong Stock Exchange.

Several European banks have issued a type of convertible bond called contingent convertible bonds. **Contingent convertible bonds**, nicknamed "CoCos," are bonds with contingent write-down provisions. Two main features distinguish bonds with contingent write-down provisions from the traditional convertible bonds just described. A traditional convertible bond is convertible at the option of the bondholder, and conversion occurs on the upside—that is, if the issuer's share price increases. In contrast, bonds with contingent write-down provisions

are convertible on the downside. In the case of CoCos, conversion is automatic if a specified event occurs—for example, if the bank's core Tier 1 capital ratio (a measure of the bank's proportion of core equity capital available to absorb losses) falls below the minimum requirement set by the regulators. Thus, if the bank experiences losses that reduce its equity capital below the minimum requirement, CoCos are a way to reduce the bank's likelihood of default and, therefore, systemic risk—that is, the risk of failure of the financial system. When the bank's core Tier 1 capital falls below the minimum requirement, the CoCos immediately convert into equity, automatically recapitalizing the bank, lightening the debt burden, and reducing the risk of default. Because the conversion is not at the option of the bondholders but automatic, CoCos force bondholders to take losses. For this reason, CoCos must offer a higher yield than otherwise similar bonds.

EXAMPLE 8

1. Which of the following is **not** an example of an embedded option?
 - A. Warrant
 - B. Call provision
 - C. Conversion provision
2. The type of bond with an embedded option that would *most likely* sell at a lower price than an otherwise similar bond without the embedded option is a:
 - A. putable bond.
 - B. callable bond.
 - C. convertible bond.
3. The additional risk inherent to a callable bond is *best* described as:
 - A. credit risk.
 - B. interest rate risk.
 - C. reinvestment risk.
4. The put provision of a putable bond:
 - A. limits the risk to the issuer.
 - B. limits the risk to the bondholder.
 - C. does not materially affect the risk of either the issuer or the bondholder.
5. Assume that a convertible bond issued in South Korea has a par value of ₩1,000,000 and is currently priced at ₩1,100,000. The underlying share price is ₩40,000, and the conversion ratio is 25:1. The conversion condition for this bond is:
 - A. parity.
 - B. above parity.
 - C. below parity.

Solution to 1: A is correct. A warrant is a separate, tradable security that entitles the holder to buy the underlying common share of the issuing company. B and C are incorrect because the call provision and the conversion provision are embedded options.

Solution to 2: B is correct. The call provision is an option that benefits the issuer. Because of this, callable bonds sell at lower prices and higher yields relative to otherwise similar non-callable bonds. A and C are incorrect because the put provision and the conversion

provision are options that benefit the investor. Thus, puttable bonds and convertible bonds sell at higher prices and lower yields relative to otherwise similar bonds that lack those provisions.

Solution to 3: C is correct. Reinvestment risk refers to the effect that lower interest rates have on available rates of return when reinvesting the cash flows received from an earlier investment. Because bonds are typically called following a decline in market interest rates, reinvestment risk is particularly relevant for the holder of a callable bond. A is incorrect because credit risk refers to the risk of loss resulting from the issuer failing to make full and timely payments of interest and/or repayments of principal. B is incorrect because interest rate risk is the risk that a change in market interest rate affects a bond's value.

Solution to 4: B is correct. A puttable bond limits the risk to the bondholder by guaranteeing a pre-specified selling price at the redemption dates.

Solution to 5: C is correct. The conversion value of the bond is $\text{₩}40,000 \times 25 = \text{₩}1,000,000$. The price of the convertible bond is $\text{₩}1,100,000$. Thus, the conversion value of the bond is less than the bond's price, and this condition is referred to as below parity.

SUMMARY

This chapter introduces the salient features of fixed-income securities while noting how these features vary among different types of securities. Important points include the following:

- The three important elements that an investor needs to know when investing in a fixed-income security are: (1) the bond's features, which determine its scheduled cash flows and thus the bondholder's expected and actual return; (2) the legal, regulatory, and tax considerations that apply to the contractual agreement between the issuer and the bondholders; and (3) the contingency provisions that may affect the bond's scheduled cash flows.
- The basic features of a bond include the issuer, maturity, par value (or principal), coupon rate and frequency, and currency denomination.
- Issuers of bonds include supranational organizations, sovereign governments, non-sovereign governments, quasi-government entities, and corporate issuers.
- Bondholders are exposed to credit risk and may use bond credit ratings to assess the credit quality of a bond.
- A bond's principal is the amount the issuer agrees to pay the bondholder when the bond matures.
- The coupon rate is the interest rate that the issuer agrees to pay to the bondholder each year. The coupon rate can be a fixed rate or a floating rate. Bonds may offer annual, semi-annual, quarterly, or monthly coupon payments depending on the type of bond and where the bond is issued.
- Bonds can be issued in any currency. Such bonds as dual-currency bonds and currency option bonds are connected to two currencies.

- The yield-to-maturity is the discount rate that equates the present value of the bond's future cash flows until maturity to its price. Yield-to-maturity can be considered an estimate of the market's expectation for the bond's return.
- A plain vanilla bond has a known cash flow pattern. It has a fixed maturity date and pays a fixed rate of interest over the bond's life.
- The bond indenture or trust deed is the legal contract that describes the form of the bond, the issuer's obligations, and the investor's rights. The indenture is usually held by a financial institution called a trustee, which performs various duties specified in the indenture.
- The issuer is identified in the indenture by its legal name and is obligated to make timely payments of interest and repayment of principal.
- For asset-backed securities, the legal obligation to repay bondholders often lies with a separate legal entity—that is, a bankruptcy-remote vehicle that uses the assets as guarantees to back a bond issue.
- How the issuer intends to service the debt and repay the principal should be described in the indenture. The source of repayment proceeds varies depending on the type of bond.
- Collateral backing is a way to alleviate credit risk. Secured bonds are backed by assets or financial guarantees pledged to ensure debt payment. Examples of collateral-backed bonds include collateral trust bonds, equipment trust certificates, mortgage-backed securities, and covered bonds.
- Credit enhancement can be internal or external. Examples of internal credit enhancement include subordination, overcollateralization, and reserve accounts. A bank guarantee, a surety bond, a letter of credit, and a cash collateral account are examples of external credit enhancement.
- Bond covenants are legally enforceable rules that borrowers and lenders agree on at the time of a new bond issue. Affirmative covenants enumerate what issuers are required to do, whereas negative covenants enumerate what issuers are prohibited from doing.
- An important consideration for investors is where the bonds are issued and traded, because it affects the laws, regulation, and tax status that apply. Bonds issued in a country in local currency are domestic bonds if they are issued by entities incorporated in the country and foreign bonds if they are issued by entities incorporated in another country. Eurobonds are issued internationally, outside the jurisdiction of any single country and are subject to a lower level of listing, disclosure, and regulatory requirements than domestic or foreign bonds. Global bonds are issued in the Eurobond market and at least one domestic market at the same time.
- Although some bonds may offer special tax advantages, as a general rule, interest is taxed at the ordinary income tax rate. Some countries also implement a capital gains tax. There may be specific tax provisions for bonds issued at a discount or bought at a premium.
- An amortizing bond is a bond whose payment schedule requires periodic payment of interest and repayment of principal. This differs from a bullet bond, whose entire payment of principal occurs at maturity. The amortizing bond's outstanding principal amount is reduced to zero by the maturity date for a fully amortized bond, but a balloon payment is required at maturity to retire the bond's outstanding principal amount for a partially amortized bond.
- Sinking fund agreements provide another approach to the periodic retirement of principal, in which an amount of the bond's principal outstanding amount is usually repaid each year throughout the bond's life or after a specified date.
- A floating-rate note, or floater, is a bond whose coupon is set based on a market reference rate (MRR) plus a spread. FRNs can be floored, capped, or collared. An inverse FRN is a bond whose coupon has an inverse relationship to the reference rate.

- Other coupon payment structures include bonds with step-up coupons, which pay coupons that increase by specified amounts on specified dates; bonds with credit-linked coupons, which change when the issuer's credit rating changes; bonds with payment-in-kind coupons, which allow the issuer to pay coupons with additional amounts of the bond issue rather than in cash; and bonds with deferred coupons, which pay no coupons in the early years following the issue but higher coupons thereafter.
- The payment structures for index-linked bonds vary considerably among countries. A common index-linked bond is an inflation-linked bond, or linker, whose coupon payments and/or principal repayments are linked to a price index. Index-linked payment structures include zero-coupon-indexed bonds, interest-indexed bonds, capital-indexed bonds, and indexed-annuity bonds.
- Common types of bonds with embedded options include callable bonds, puttable bonds, and convertible bonds. These options are "embedded" in the sense that there are provisions provided in the indenture that grant either the issuer or the bondholder certain rights affecting the disposal or redemption of the bond. They are not separately traded securities.
- Callable bonds give the issuer the right to buy bonds back prior to maturity, thereby raising the reinvestment risk for the bondholder. For this reason, callable bonds have to offer a higher yield and sell at a lower price than otherwise similar non-callable bonds to compensate the bondholders for the value of the call option to the issuer.
- Puttable bonds give the bondholder the right to sell bonds back to the issuer prior to maturity. Puttable bonds offer a lower yield and sell at a higher price than otherwise similar non-puttable bonds to compensate the issuer for the value of the put option to the bondholders.
- A convertible bond gives the bondholder the right to convert the bond into common shares of the issuing company. Because this option favors the bondholder, convertible bonds offer a lower yield and sell at a higher price than otherwise similar non-convertible bonds.

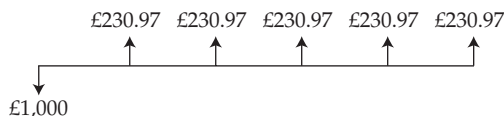
PRACTICE PROBLEMS

1. A 10-year bond was issued four years ago. The bond is denominated in US dollars, offers a coupon rate of 10% with interest paid semi-annually, and is currently priced at 102% of par. The bond's:
 - A. tenor is six years.
 - B. nominal rate is 5%.
 - C. redemption value is 102% of the par value.
2. A sovereign bond has a maturity of 15 years. The bond is *best* described as a:
 - A. perpetual bond.
 - B. pure discount bond.
 - C. capital market security.
3. A company has issued a floating-rate note with a coupon rate equal to the three-month MRR + 65 bps. Interest payments are made quarterly on 31 March, 30 June, 30 September, and 31 December. On 31 March and 30 June, the three-month MRR is 1.55% and 1.35%, respectively. The coupon rate for the interest payment made on 30 June is:
 - A. 2.00%.
 - B. 2.10%.
 - C. 2.20%.

4. The legal contract that describes the form of the bond, the obligations of the issuer, and the rights of the bondholders can be *best* described as a bond's:
 - A. covenant.
 - B. indenture.
 - C. debenture.
5. Which of the following is a type of external credit enhancement?
 - A. Covenants
 - B. A surety bond
 - C. Overcollateralization
6. An affirmative covenant is *most likely* to stipulate:
 - A. limits on the issuer's leverage ratio.
 - B. how the proceeds of the bond issue will be used.
 - C. the maximum percentage of the issuer's gross assets that can be sold.
7. Which of the following *best* describes a negative bond covenant? The issuer is:
 - A. required to pay taxes as they come due.
 - B. prohibited from investing in risky projects.
 - C. required to maintain its current lines of business.
8. A South African company issues bonds denominated in pound sterling that are sold to investors in the United Kingdom. These bonds can be *best* described as:
 - A. Eurobonds.
 - B. global bonds.
 - C. foreign bonds.
9. Relative to domestic and foreign bonds, Eurobonds are *most likely* to be:
 - A. bearer bonds.
 - B. registered bonds.
 - C. subject to greater regulation.
10. An investor in a country with an original issue discount tax provision purchases a 20-year zero-coupon bond at a deep discount to par value. The investor plans to hold the bond until the maturity date. The investor will *most likely* report:
 - A. a capital gain at maturity.
 - B. a tax deduction in the year the bond is purchased.
 - C. taxable income from the bond every year until maturity.
11. A bond that is characterized by a fixed periodic payment schedule that reduces the bond's outstanding principal amount to zero by the maturity date is *best* described as a:
 - A. bullet bond.
 - B. plain vanilla bond.
 - C. fully amortized bond.
12. If interest rates are expected to increase, the coupon payment structure *most likely* to benefit the issuer is a:
 - A. step-up coupon.
 - B. inflation-linked coupon.
 - C. cap in a floating-rate note.
13. Investors who believe that interest rates will rise *most likely* prefer to invest in:
 - A. inverse floaters.
 - B. fixed-rate bonds.
 - C. floating-rate notes.

14. A 10-year, capital-indexed bond linked to the Consumer Price Index (CPI) is issued with a coupon rate of 6% and a par value of 1,000. The bond pays interest semi-annually. During the first six months after the bond's issuance, the CPI increases by 2%. On the first coupon payment date, the bond's:
 - A. coupon rate increases to 8%.
 - B. coupon payment is equal to 40.
 - C. principal amount increases to 1,020.
15. The provision that provides bondholders the right to sell the bond back to the issuer at a predetermined price prior to the bond's maturity date is referred to as:
 - A. a put provision.
 - B. a make-whole call provision.
 - C. an original issue discount provision.
16. Which of the following provisions is a benefit to the issuer?
 - A. Put provision
 - B. Call provision
 - C. Conversion provision
17. Relative to an otherwise similar option-free bond, a:
 - A. puttable bond will trade at a higher price.
 - B. callable bond will trade at a higher price.
 - C. convertible bond will trade at a lower price.
18. Which type of bond *most likely* earns interest on an implied basis?
 - A. Floater
 - B. Conventional bond
 - C. Pure discount bond
19. Clauses that specify the rights of the bondholders and any actions that the issuer is obligated to perform or is prohibited from performing are:
 - A. covenants.
 - B. collaterals.
 - C. credit enhancements.
20. Which of the following type of debt obligation *most likely* protects bondholders when the assets serving as collateral are non-performing?
 - A. Covered bonds
 - B. Collateral trust bonds
 - C. Mortgage-backed securities
21. Which of the following *best* describes a negative bond covenant? The requirement to:
 - A. insure and maintain assets.
 - B. comply with all laws and regulations.
 - C. maintain a minimum interest coverage ratio.
22. Contrary to positive bond covenants, negative covenants are *most likely*:
 - A. costlier.
 - B. legally enforceable.
 - C. enacted at time of issue.

23. A five-year bond has the following cash flows:



- The bond can *best* be described as a:
- A. bullet bond.
 - B. fully amortized bond.
 - C. partially amortized bond.
24. Investors seeking some general protection against a poor economy are *most likely* to select a:
- A. deferred coupon bond.
 - B. credit-linked coupon bond.
 - C. payment-in-kind coupon bond.
25. The benefit to the issuer of a deferred coupon bond is *most likely* related to:
- A. tax management.
 - B. cash flow management.
 - C. original issue discount price.
26. Which of the following bond types provides the *most* benefit to a bondholder when bond prices are declining?
- A. Callable
 - B. Plain vanilla
 - C. Multiple put
27. Which type of call bond option offers the *greatest* flexibility as to when the issuer can exercise the option?
- A. Bermuda call
 - B. European call
 - C. American call
28. Which of the following *best* describes a convertible bond's conversion premium?
- A. Bond price minus conversion value
 - B. Par value divided by conversion price
 - C. Current share price multiplied by conversion ratio