

## R39 Fixed-Income Securities: Defining Elements

1. Introduction and Overview of a Fixed-Income Security .....	2
1.1 Overview of a Fixed-Income Security .....	2
2. Bond Indenture .....	5
2.1 Bond Indenture .....	5
3. Legal, Regulatory, and Tax Considerations .....	9
3.1 Tax Considerations .....	10
4. Principal Repayment Structures .....	10
4.1 Principal Repayment Structures .....	10
5. Coupon Payment Structures .....	13
6. Callable and Puttable Bonds .....	13
6.1 Callable Bonds .....	14
6.2 Puttable Bonds .....	15
7. Convertible Bonds .....	16
Summary .....	18
Practice Questions .....	22

This document should be read in conjunction with the corresponding reading in the 2022 Level I CFA® Program curriculum. Some of the graphs, charts, tables, examples, and figures are copyright 2021, CFA Institute. Reproduced and republished with permission from CFA Institute. All rights reserved.

Required disclaimer: CFA Institute does not endorse, promote, or warrant the accuracy or quality of the products or services offered by IFT. CFA Institute, CFA®, and Chartered Financial Analyst® are trademarks owned by CFA Institute.

Version 1.0

## 1. Introduction and Overview of a Fixed-Income Security

There are two ways for an entity to raise capital: issuing equity and issuing fixed-income securities. Fixed-income is a commonly used method for governments and companies to borrow money from investors. Fixed-income securities differ from equities in several ways:

- A fixed-income investor has no ownership rights in the business.
- The money borrowed (principal) is repaid at maturity. In addition, interest on the borrowed money is paid periodically.
- Fixed income investors get paid before the common shareowners; hence the risk is lower.

Note that fixed-income security, bond, and debt are used interchangeably throughout this reading.

### 1.1 Overview of a Fixed-Income Security

Three important elements that an investor should know when investing in fixed-income securities are:

1. A bond's features.
2. Legal, regulatory, and tax considerations.
3. Contingency provisions.

#### Basic Features of a Bond

The basic features of a fixed-income security include:

##### Issuer:

Issuer is the entity that has issued the bond, or the one who has borrowed money. It is responsible for servicing the debt (paying interest and principal payments). Bonds can be classified into the following categories based on the type of the issuer:

- Supranational organizations: Bonds issued by international organizations such as the World Bank and IMF.
- Sovereign governments: Debt of national governments such as government of the United States, Germany, or Italy.
- Non-sovereign governments: Bonds that are not issued by a national or central government. Instead, these are issued by states, provinces, municipalities, etc. For example, municipal bonds in the United States, etc.
- Quasi-government entities: Bonds issued by agencies that are financed either directly or indirectly by the government. They are also called sub-sovereign or agency bonds. For example, Ginnie Mae, Fannie Mae, and Freddie Mac in United States.
- Companies: Bonds issued by a corporate. A distinction is often made between financial issuers and non-financial issuers.

All bonds are exposed to credit risk. **Credit risk** is the risk that interest and principal payments will not be made by the issuer as they come due. Credit rating agencies such as

Moody's and S&P assign a rating to issuers based on this risk.

Bonds can be classified into two categories based on their creditworthiness:

- Investment grade.
- Non-investment grade, or high-yield or speculative bonds.

Maturity:

The maturity date is the date on which the issuer will redeem the bond by paying the outstanding principal amount. Once a bond has been issued, the time remaining until maturity is known as the tenor of the bond.

- If original maturity is one year or less, the bond is called money market security.
- If original maturity is more than a year, the bond is called capital market security.

Par value:

Also known as face value, maturity value, or redemption value.

- It is the principal amount that is repaid to bondholders at maturity.
- If market price > par value, the bond is trading at a premium.
- If market price < par value, the bond is trading at a discount.
- If market price = par value, the bond is trading at par.

Coupon rate and frequency:

Coupon rate is the percentage of par value that the issuer agrees to pay to the bondholder annually as interest. It can be a fixed rate or a floating rate. The coupon frequency may be annual, semi-annual, quarterly, or monthly. Based on the frequency of coupon payments, we can classify bonds into the following:

- Plain vanilla bond: It is the most basic type of bond with periodic fixed interest payments during the bond's life and the principal paid on maturity.
- Floating-rate bond or floating-rate notes or floaters: Unlike vanilla bonds, the interest rate of a floating-rate bond is not fixed. The coupon payments are based on a floating rate of interest like Libor (London Interbank Offered Rate) at the start of the period. Some bonds specify the coupon rate as two components: a reference rate, such as Libor, plus a spread. The coupon rate and coupon interest paid in every period changes as the reference rate changes.
- Zero-coupon bonds or pure discount bonds: Bonds that have only one payment at maturity. These are bonds that do not make a coupon payment over a bond's life, and are sold at a discount (less than the par value) at issuance. At maturity, the investor receives the par value of the bond. Think of it as interest getting accumulated during the bond's life and being paid at maturity for a zero-coupon bond.

Currency denomination:

- Bonds can be issued in any currency.
- Dual currency bonds pay interest in one currency and principal in another currency.

- Currency option bonds give the bondholders the option to choose between two currencies they would like to receive their payments in.

**Example**

Test your understanding of the concepts discussed so far by answering the following questions.

1. What is a sovereign bond?
2. What is credit risk?
3. In what time-frame does a money market security mature?
4. If a bond's price is lower than its par value, it is called a \_\_\_\_ bond.
5. What is the periodic interest payment for a bond that has a par value of \$1000 and a coupon rate of 6%? The coupon payments are made semi-annually.
6. The coupon rate of a floating-rate note that makes payments in June and December is expressed as six-month Libor + 50 bps. Assuming that the six-month Libor is 2.00% at the end of June 2016 and 2.50% at the end of December 2016. What is the interest rate that applies to the payment due in December 2016?
7. Which type of bond allows bondholders to choose the currency in which they receive each interest payment and principal repayment?

**Solution:**

1. A bond issued by a central government such as the U.S. or German government is a sovereign bond. A bond issued by the World Bank or by a province is not considered a sovereign bond.
2. Credit risk is the risk of loss when an issuer fails to make full and timely payment of interest and principal.
3. Less than one year. Capital market securities have maturity greater than one year.
4. Discount.
5. Annual coupon payment is  $0.06 \times 1000 = \$60$ . The coupon payments are made semi-annually, so \$30 paid twice a year. You can calculate it as  $(0.06/2) \times 1000 = \$30$ .
6. The interest rate that applies to the payment due in December 2016 is the six-month Libor at the end of June 2016 plus 50 bps. Thus, it is 2.50% (2.00% + 0.50%).
7. Currency option bond.

**Yield Measures**

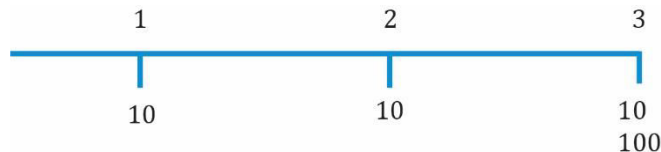
There are two widely used yield measures to describe a bond: current yield and yield to maturity.

Current yield or Running yield

Current yield is the annual coupon divided by the bond's price and is expressed as a percentage. For example, consider a three-year, annual coupon bond with a par value of \$100. The bond is issued at \$95. The coupon rate is 10%, so the coupon payments are \$10 every year. Current yield =  $\frac{10}{95} = 10.5\%$

Yield to Maturity (YTM)

Yield to maturity is the internal rate of return on a bond's expected cash flows. In other words, it is the expected annual rate of return an investor will earn if the bond is held to maturity. It is also known as **yield to redemption** or **redemption yield**. The IRR can be calculated easily using the financial calculator. Let us consider the same bond as in the current yield example:



Input these values:  $CF_0 = -95$ ;  $CF_1 = 10$ ;  $CF_2 = 10$ ;  $CF_3 = 110$ . Computing for IRR, you should get 12.08%. As you can see, YTM is higher than the coupon rate. For a discount bond such as this one, the YTM is higher than the coupon rate. A bond's price is inversely related to its yield to maturity.

## 2. Bond Indenture

A bond is a contractual agreement between the issuer and the bondholders. In this section, we will discuss the following:

1. Bond indenture (trust deed).
2. Legal and regulatory considerations.
3. Tax considerations.

### 2.1 Bond Indenture

Given below are a few terms related to bonds which we should remember:

**Trust deed or bond indenture:** A written legal agreement between the bond issuer and the investor. The indenture has the following information:

- The name of the issuer.
- All the terms of a bond issue such as the type of bond.
- Its features such as the principal value, coupon rate, dates when interest payments will be made, and maturity date.
- Issuer's obligations.
- Bondholders' rights.
- If the bonds are secured or not.
- Covenants.

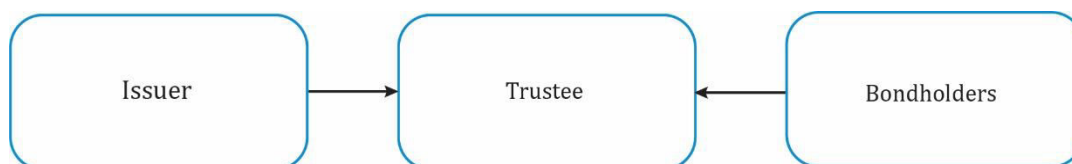
- Contingency provisions like call option.

**Collateral:** Are assets or financial guarantees offered by the issuer for the underlying debt issue. This is in addition to the promise to pay interest and principal. It is like a security for the investors if the bond issuer (or borrower) fails to make payments.

**Credit enhancement:** Provision used by a company to improve its creditworthiness or reduce the credit risk of a bond issue.

**Covenant:** Clauses that state what an issuer can and cannot do; includes restrictions imposed on the issuer such as raising more capital to protect the bondholders. Specifies the rights of bondholders.

Assume a company such as General Electric announces a \$1 billion bond issue. Millions of investors will invest in the issue. It is practically impossible for the company to enter into a legal contract with each one of them, so it entrusts the fiduciary responsibility of the issue to an intermediary called the trustee. The trustee is appointed by the issuer.



The trustee is a financial institution, like the trust department of a bank. The trustee holds the indenture. Its duties are primarily administrative in nature like invoicing the issuer for interest and principal payments, holding funds until they are paid, calling meetings of bondholders, ensuring the issuer adheres to the terms stated in the indenture, etc. If the issuer defaults, the role of the trustee becomes significant.

In addition to a bond's features, an investor must review the following aspects (especially his rights in case of a default):

- Legal identity of the bond issuer and its legal form.
- Source of payment proceeds.
- Asset or collateral backing.
- Credit enhancements.
- Covenants.

### Legal Identity of the Bond Issuer and its Legal Form

The bond issuer has the legal obligation to pay the interest and principal. The issuer is identified in the indenture by its legal name. Investors must understand who is issuing the bond.

- For a sovereign bond, it is the entity responsible for managing the national budget such as HM Treasury in the United Kingdom.
- For a corporate bond, it is the corporate legal entity such as Wal-Mart Stores Inc., Volkswagen AG, etc.

- Some companies are structured in a way that there is a holding company at the top, under which there are many operating/group companies. Bonds may be issued by the holding company, a parent company, or a subsidiary. It is important to evaluate the credit risk of the company for which bond is being issued rather than the issuer.
- In case of securitized bonds, the sponsor has the legal obligation to pay the bondholders. Sponsor is the financial institution in charge of the securitization process.

### Source of Repayment Proceeds

Investors need to know how the issuer intends to make interest payments and repay the principal. The bond indenture specifies the source of revenue or how the issuer intends to make interest and principal payments. We look at the repayment sources for each category now.

- For supranational bonds: From repayment of previous loans or paid-in capital from its members. For example, the World Bank may have given a loan to a particular country. When the country pays back the loan, this money is used to pay the bondholders. Paid-in capital is the amount contributed by member nations.
- For sovereign bonds: Tax revenues and printing new money. The government may also increase taxes to service debt.
- Three sources for non-sovereign government debt issues: the taxing authority of the issuer, cash flows of the project, special taxes or fees.
- For corporate bonds: Cash flow generated by the company's primary operations. The higher the credit risk, the higher the yield.
- For securitized bonds: Cash flows generated by the underlying assets such as mortgages, credit card receivables, auto loans, etc. Securitized bonds are amortized, i.e., the principal is paid back gradually over the bond's life rather than in one payment at maturity.

### Asset or Collateral Backing

Collateral reduces credit risk.

- Secured vs. unsecured bonds: In a secured bond, assets are pledged as collateral to ensure debt repayment in the case of a default. Unsecured bonds have no collateral.
- Seniority ranking: What this means is that if a company faces bankruptcy and its assets are liquidated, the investors (or bondholders) are repaid based on seniority.
- Debentures: It is a type of bond that may be secured or unsecured. In most countries, debentures refer to unsecured bonds. However, in some countries like the United Kingdom and India, they are backed by collateral.

Bonds can be classified into the following based on the type of collateral backing:

- Collateral trust bonds: Bonds that are secured by a financial asset such as stocks and other bonds. They are deposited by the issuer and held by the trustee.

- Equipment trust certificates: Bonds secured by physical assets or equipment such as railroad cars, aircraft, or oil rigs.
- Mortgage-backed securities: They are backed by a pool of mortgages. The interest and principal payments from the mortgages are used to pay the bond-holders. We will see this in detail in the subsequent readings.
- Covered bond: Debt securities that are backed by a “cover pool” of assets such as mortgage loans or public sector loans. In some ways they are similar to securitized bonds such as MBS, but they offer a greater degree of protection.

### **Credit Enhancements (if any)**

Credit enhancements are provisions used to reduce the credit risk of a bond issue using additional collateral, insurance, or third-party guarantee. These are usually used for securitized bonds. When credit risk is reduced, it increases the issue’s credit quality and decreases the interest rate of the bond. There are two types of credit enhancements: internal and external.

Internal credit enhancements: No external instrument is used in this case to increase the credit quality.

- *Senior/junior*: In this structure, debt is segregated into different tranches with different priority based on seniority. The cash flows generated from the assets are allotted to these different tranches accordingly with the senior tranche getting paid before the junior tranches. This arrangement is called a waterfall structure. The subordinate or junior tranches offer credit protection to the senior tranches.
- *Overcollateralization*: The process of posting more collateral than is required, to obtain financing. The value of the asset pledged as collateral exceeds the value of the loan.
- *Excess spread*: It is the difference between the interest rate received on the underlying asset, and coupon rate paid to investors. The excess amount is deposited into a reserve account which is used to absorb losses on assets. It is also called excess interest cash flow.

External credit enhancements: Relies on a third party called a guarantor, to provide a guarantee.

- *Surety bonds/bank guarantees*: A bond that guarantees to pay the investor if the issuer defaults. It is similar to a bank guarantee but issued by an insurance company.
- *Letter of credit*: It is a document or a letter from a financial institution, typically a bank. It guarantees the payment of interest and principal to investors if the issuer is unable to pay.

### **Covenants (if any)**

*Note: This section is important and explicitly stated as a learning objective.*

Bond covenants are legally enforceable rules that borrowers and lenders agree on at the time of a new bond issue. Covenants can be affirmative (positive) or negative (restrictive).



Affirmative covenants indicate what the issuer must do. These are generally administrative in nature. They do not impose additional costs on the issuer. For example, the issuer must:

- Make interest and principal payments on time.
- Comply with all laws and regulations.
- Maintain current lines of business.
- Insure and maintain assets.
- Pay taxes on time.
- Other examples include a 'pari passu' 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.

Negative covenants indicate what the issuer must not do. These are frequently costlier and materially constrain the issuer's potential business decisions. Examples include:

- Restrictions on debt: Limits on maximum acceptable leverage ratios and minimum acceptable interest coverage ratios.
- Negative pledges: No additional debt can be issued that is senior to existing debt.
- Restrictions on prior claims: The issuer cannot collateralize assets that were previously collateralized. The objective is to protect unsecured bondholders.
- Restrictions on distribution to shareholders: Restrictions on how much money can be spent on dividends and buy-backs.
- Restrictions on asset disposals: A limit on the total amount of assets that can be disposed during a bond's life. The objective is to ensure the company does not breakup.
- Restrictions on investments: This ensures no investment is made in a speculative business and that the capital is invested in a going-concern business.
- Restrictions on mergers and acquisitions.

### 3. Legal, Regulatory, and Tax Considerations

Fixed-income securities are subject to different legal and regulatory requirements depending on where they are issued and traded. National bond market is the bond market in a particular country.

- **Domestic bonds:** These are bonds that are issued and traded in a country, and denominated in the currency of that country. Bonds in domestic currency issued by a company incorporated in that country are called domestic bonds. For example, bonds denominated in Yen, issued by Toyota to be traded in Japan.
- **Foreign bonds:** These are bonds issued by a foreign company but traded in the domestic market. For example, bonds denominated in U.S. dollars issued by the Australian Rio Tinto Group.

**Eurobonds** are issued internationally, outside the jurisdiction of any single country and are denoted in currency other than that of the countries in which they trade. They are subject to

less regulation than domestic bonds.

### **Bearer Bonds versus Registered Bonds**

In the case of bearer bonds, the trustee does not maintain a record of who owns the bonds. That information is recorded in the clearing system. In the case of registered bonds, records of who owns the bond are maintained using a name or serial number. In the past, Eurobonds were typically bearer bonds. However, nowadays, Eurobonds as well as domestic and foreign bonds are registered bonds.

### **Global Bonds**

Bonds that are issued simultaneously in multiple markets, such as the Eurobond market and in at least one domestic bond market. This ensures sufficient demand for the issue irrespective of the investors' location.

### **3.1 Tax Considerations**

There are two sources of return from a bond: income from coupon payments and capital gain. The way these two components are treated for tax purposes is different.

- The income portion of a bond investment is generally taxed at the ordinary income tax rate. For example, if you fall under the 30% income tax category, then the coupon income will be taxed at this rate.
- Assume you buy a bond for \$900 and later sell it for \$1,000. This \$100 is considered capital gain. Tax on capital gain may be different for long-term and short-term investments. Short-term is usually less than one year while more than one year is considered long-term. Often, the tax rate for long-term capital gains is lower than that for short-term capital gains.
- In some countries, a pro-rated portion of discount may be included in interest income. For example, assume you buy a 3-year zero-coupon bond, with a par value of \$1,000, at \$900. The gain of \$100 is over three years. Now, the taxing authority in some countries such as the U.S. may decide to tax this \$100 gain on a pro-rata basis over three years instead of taxing it all at once at the end of three years.

## **4. Principal Repayment Structures**

Not all bonds are structured to make periodic interest payments and one lump-sum principal payment at the end. In this section we will look at the different ways in which principal and interest can be paid over the bond's life.

### **4.1 Principal Repayment Structures**

**Bullet bond:** The principal is paid all at once at maturity. Such a type of bond is called a bullet bond.

**Bullet Bond: Payment Structure for a 5-year, \$1000 Bond with 6% Coupon Paid Annually**

Year	Cash flow in \$	Interest Payment (in \$)	Principal Repayment (in \$)	Outstanding principal (in \$)
0	-1,000			1,000
1	60	60	0	1,000
2	60	60	0	1,000
3	60	60	0	1,000
4	60	60	0	1,000
5	$1000 + 60 = 1060$	60	1,000	0

Key points to be noted for a bullet bond (based on the table above):

- No part of the principal is paid before maturity. The \$1,000 amount towards principal is paid all at once at maturity.
- During the life of the bond, the principal remains outstanding.
- The last payment includes both the coupon payment of \$60 and principal payment of \$1,000.

**Fully amortized:** A fully amortized bond is one in which the principal is paid little by little in equal payments over the bond's life, so that it is repaid in full by the maturity date. The periodic payments made by the issuer consist of interest and a part of principal as shown for a sample bond in the table below.

<b>Fully Amortized Bond: Payment Structure for a 5-year, \$1,000 Bond with 6% Coupon Paid Annually, market interest rate = 6%</b>				
Year	Investor cash flows in \$ $a = b + c$	Interest Payment (in \$) $b$	Principal Repayment (in \$) $c$	Outstanding principal (in \$) $P_{t-1}-c$
0	-1,000			1,000
1	237.40	60	177.4	822.6
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

**Partially amortized:** A partially amortized bond is one in which only a part of the principal is repaid over the bond's life. The remaining big part of the principal is paid at maturity making it a balloon payment. This is a hybrid between the bullet and the fully-amortized bond. The table below shows a sample bond.

<b>Partially Amortized Bond: Payment Structure for a 5-year, \$1,000 Bond with 6% Coupon Paid Annually</b>				
--	--	--	--	--

Year	Investor cash flows (Coupon) in \$	Interest Payment (in \$)	Principal Repayment (in \$)	Outstanding principal (in \$)
0	-1,000			1,000
1	201.92	60	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

### Sinking Fund Arrangements

Sinking fund arrangement: This allows for full or partial amortization of a bond prior to its maturity. It specifies the portion of the bond's principal outstanding that must be repaid each year throughout the bond's life.

Three sinking fund arrangements:

- Standard: Issuer sends the repayment principal amount to the trustee. The trustee then either redeems bonds to this value or decides which bonds to retire through a lottery.
- Accelerated: Issuer retires more than the specified portion of the bond's notional principal. The amount redeemed steadily increases each year. If there is any remaining principal, it is redeemed at maturity.
- Call provision: Bonds with call provision give the issuer the right to call (repurchase) the bond before maturity. Callable bonds usually have higher yields as investors bear the risk that they may be called. It is beneficial to the issuer and disadvantageous to the bondholder. The bonds to be retired are selected randomly.

A sinking fund arrangement results in

- Lower credit risk: The objective of a sinking fund provision is to reduce credit risk for investors because the issuer does not have to pay a large payment at maturity. From an investor's perspective, there is less credit risk as the principal is being paid over the bond's term.
- Higher reinvestment risk: Receiving principal payments before maturity also means the investor has to bear reinvestment risk, i.e., if the money received cannot be invested at the same or higher expected return. In a declining interest rate environment, there is a risk of investing the proceeds at a lower rate.

## 5. Coupon Payment Structures

### Fixed periodic coupons

- This is the most basic form of coupon payment. A fixed interest is paid either semi-

annually or annually.

### **Floating-rate notes (FRN)**

- A bond whose coupon is set based on some reference rate plus a spread.
- FRNs can have floors (minimum interest rate), caps (maximum interest rate), or collars (both a minimum and maximum rate).
- An inverse FRN is a bond whose coupon has a negative relationship with the reference rate.

### **Other coupon structures**

- Step-up coupons: Coupons increase by specified amounts on specified dates.
- Bonds with credit-linked coupons: Coupons change when the issuer's credit rating changes.
- Bonds with payment-in-kind coupons (also called a split coupon bond): Issuer can pay coupons with additional amounts of the bond issue instead of cash.
- Bonds with deferred coupons: No coupons paid in the initial years but higher coupons paid later.
- Index-linked bonds: Coupon payments and/or principal repayments are linked to a price index, i.e., inflation-linked bonds. Examples of inflation-linked bonds include the following:
  - Zero-coupon-indexed bonds: The inflation adjustment is made via the principal repayment only.
  - Interest-indexed bonds: An index-linked coupon is paid during the bond's life but nominal principal amount at maturity is fixed. This is essentially a floating-rate note in which reference rate is the inflation rate instead of a market rate such as Euribor.
  - Capital-indexed bonds: Fixed coupon rate is paid but it is applied to a principal amount that increases in line with increases in the index during the bond's life.
  - Indexed-annuity 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. These are fully amortized bonds, unlike interest-indexed and capital-indexed bonds that are non-amortizing coupon bonds.

## **6. Callable and Puttable Bonds**

A contingency provision is a clause in a legal document that allows for some action if the event or circumstance does occur. It is also called an embedded option.

### **6.1 Callable Bonds**

A callable bond gives the issuer the right to redeem all or part of the bond before the specified maturity date. Investors face reinvestment risk with callable bonds, as it is not possible to reinvest the proceeds at the previous higher interest rates. To compensate this risk to an extent, issuers offer a higher yield and sell at a lower price than the respective non-

callable bonds.

### Why companies issue callable bonds?

- To protect the issuer when market interest rates drop.
- Interest rates drop when market interest rates fall or the credit quality of the issuer improves. The issuer has an opportunity to call the old bonds and replace them with new cheaper bonds by saving on otherwise higher interest expenses.
- Companies also issue callable bonds to signal the market about their credit quality.

The following details about a callable bond are included in the indenture:

- Call price: Price paid by the issuer to the bondholder when the bond is called.
- Call premium: The amount paid on top of the face value as compensation to bondholders as they will have to reinvest proceeds at a lower rate.
- Call schedule: The dates and prices at which the bond may be called.
- Call protection period: It is also known as the lockout period, deferment, or cushion period. During this period, a bond may not be called by the issuer. It is typically in the early days of a bond's life to encourage investors to invest in the issue.
- Call date: The earliest date at which a bond may be called.

The three types of callable bonds based on exercise styles are listed below:

- American call: The issuer has the right to call the bond any time after the first call date.
- European call: The issuer has the right to call the bond only once after the first call date.
- Bermuda-style call: The issuer has the right to call the bond on specific dates after the call protection period.

### Example

Assume a hypothetical 20-year bond is issued on 1 December 2012 at a price of 97.315 (as a percentage of par). Each bond has a par value of \$100. The bond is callable in whole or in part every 1 December from 2017 at the option of the issuer. The callable prices are shown below.

Year	Call Price	Year	Call Price
2017	103.78	2023	101.47
2018	103.54	2024	101.21
2019	103.10	2025	100.68
2020	102.81	2026	100.32
2021	102.23	2026 and thereafter	100.00
2022	101.59		

1. What is the call protection period?
2. What is the call premium (per bond) in 2021?

3. What type of a callable bond is it *most likely*?

**Solution:**

1. The bonds were issued in 2012 and are first callable in 2017. The call protection period is  $2017 - 2012 = 5$  years.
2. The call prices are stated as a percentage of par. The call price in 2021 is \$102.23 ( $102.23\% \times \$100$ ). The call premium is the amount paid above par by the issuer. The call premium in 2021 is \$2.23 ( $\$102.23 - \$100$ ).
3. It is a Bermuda call. The bond is callable every 1 December from 2017 – that is, on specified dates following the call protection period. Thus, the embedded option is a Bermuda call.

## 6.2 Putable Bonds

A putable bond gives the bondholder the right to sell the bond back to the issuer at a pre-determined price on specified dates. Putable bonds offer a lower yield and sell at a higher price relative to otherwise non-putable bonds. Putable bonds are beneficial to the bondholder because:

- When interest rates rise, bond prices fall. If the selling price is pre-specified, bondholders may put (sell) back the bond to the issuer at that price, which is higher than the market price when interest rates rise.
- Cash can be reinvested at higher rates.

The following details about a putable bond are included in the indenture:

- Redemption dates.
- Selling price; usually equal to the face value of the bond.
- How many times the issuer allows bondholders to sell the bond during the bond's life.
- One-time put: Gives bondholders a single sellback opportunity.
- Multiple put: More than one sellback opportunity available. Priced higher than one-time put bonds.

Like callable bonds, putable bonds are also classified into three, based on their exercise styles:

- American put: Bondholder has the right to sell the bond back to the issuer any time after the first put date.
- European put: Bondholder has the right sell the bond back to the issuer only once on the put date.
- Bermuda-style put: Bondholder has the right sell the bond back to the issuer only on specified dates.

## 7. Convertible Bonds

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.

<b>Advantages of Convertible Bonds</b>	
<b>From investor's perspective</b>	<b>From issuer's perspective</b>
Opportunity to convert into equity if share prices are increasing and participate in upside.	Reduced interest expense; lower yield than otherwise non-convertible bond because of the conversion provision given to bondholders.
Downside protection if shares prices are falling.	Elimination of debt if conversion option is exercised. So they do not have to repay the debt.
	Convertible bonds are usually callable.

Some terms associated with the conversion provision are given below:

- **Conversion price:** Price per share at which the convertible bond can be converted into shares.
- **Conversion ratio:** Number of shares that each bond can be converted into.  

$$\text{Conversion ratio} = \frac{\text{Par value}}{\text{Conversion price}}$$
- **Conversion value:** Current share price multiplied by the conversion ratio. It is also called the parity value.  

$$\text{Conversion value} = \text{current share price} * \text{conversion ratio}$$
- **Conversion premium:** Difference between the convertible bond's price and its conversion value.  

$$\text{Conversion premium} = \text{convertible bond's price} - \text{conversion value}$$

**Warrant:** A warrant is an attached option, not an embedded option. It gives the bondholder the right to buy the underlying common shares at a fixed price called the exercise price any time before the expiration date.

**Contingent Convertible (CoCo) Bonds:** These are bonds with contingent write-down provisions. The bonds can be converted into equity contingent to a specific condition. For example, a CoCo bond might be allowed to be converted into equity only after it reaches a certain price.

### Example

Assume that a convertible bond issued in the United Kingdom has a par value of £1,000 and is currently priced at £1,200. The underlying share price is £56 and the conversion ratio is 25:1. What is the conversion condition for this bond?

### Solution:

The conversion value of the bond is  $£56 \times 25 = £1,400$ . The price of the convertible bond is £1,200. Thus, the conversion value of the bond is more than the bond's price, and this



condition is referred to as above parity.

## Summary

### LO.a: Describe the basic features of a fixed-income security.

The basic features of a fixed-income security include the specification of:

- **Issuer:** It is the entity that has issued the bond. The types of issuers include supranational organizations, sovereign governments, non-sovereign governments, quasi-government entities, and companies.
- **Maturity:** It is the date on which the last payment is made for a bond. Based on maturity, bonds can be classified into money market security, capital market security, and perpetual bonds.
- **Par value:** It is the amount an issuer agrees to pay the investor or bondholder on maturity date. A bond is premium if sold above par, discount if sold below par, and at par if sold at face value.
- **Coupon rate and frequency:** Coupon rate is the interest rate paid on a bond every year by the issuer until its maturity date. Bonds that have only one payment at maturity are called zero-coupon bonds.
- **Currency denomination:** A bond can be issued in any currency: the local currency, or in a widely traded one like the yen, euro, or U.S. dollar. Bonds that pay coupon in one currency and principal in another currency are called dual currency bonds.

### LO.b: Describe functions of a bond indenture.

Bond indenture is a legal agreement between the bond issuer and the investor. It includes all the terms of a bond issue such as the type of bond, its features such as principal value and coupon rate, and maturity date. It also includes the dollar amount of issue, issuer's obligations, bondholders' rights, when the coupon payments will be made, if the bonds are secured or not, covenants, and contingency provisions.

### LO.c: Compare affirmative and negative covenants and identify examples of each.

Bond covenants are legally enforceable rules that borrowers and lenders agree on at the time of a new bond issue. Covenants can be affirmative (positive) or negative (restrictive).

Affirmative covenants indicate what the issuer must do. These are generally administrative in nature. For example issuer must make interest and principal payments on time, comply with laws and regulations, insure and maintain assets, etc.

Negative covenants indicate what the issuer must not do. These are frequently more costly and materially constrain the issuer's potential business decisions. Examples include restriction on debt, negative pledges, restrictions on prior claims, restrictions on distribution to shareholders, etc.

### LO.d: 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

depending on where they are issued and traded. National bond market is the bond market in a particular country. It includes domestic bonds as well as foreign bonds. Eurobonds are international bonds that can be denominated in any currency.

Other legal and regulatory issues are:

- Legal identity of the bond issuer and its legal form.
- Source of repayment proceeds.
- Asset or collateral backing: Collateral reduces credit risk. Bonds that have collateral are called secured bonds. Debenture refers to unsecured bonds in most countries and secured bonds in a few countries. Collateral backed bonds include collateral trust bonds, equipment trust certificates, mortgage-backed, and covered bonds.
- Credit enhancements: These are provisions used to reduce the credit risk of a bond issue using additional collateral, insurance, or third-party guarantee. Internal credit enhancements include senior/junior tranches, over-collateralization and, excess spread. External credit enhancements include surety bonds/bank guarantees, letter of credit, etc.

#### Tax Considerations:

The two sources of return from a bond are treated differently for tax purposes:

- The income portion of a bond investment is generally taxed at the ordinary income tax rate.
- Tax on capital gain may be different for long-term and short-term investments.
- In some countries, a pro-rated portion of discount may be included in interest income.

#### **LO.e: Describe how cash flows of fixed-income securities are structured.**

The cash flows to investors can be divided into principal repayment and coupon payments.

Principal can be repaid in three ways:

- Bullet bond: Principal is paid all at once at maturity.
- Fully amortized: In this method the principal is paid little by little, in equal payments over the bond's life, so that it is repaid in full by the maturity date.
- Partially amortized: Only a part of the principal is repaid over the bond's life. The remaining large part of the principal is paid at maturity, making it a balloon payment. This is a hybrid between the bullet and the fully-amortized bond.

The sinking fund arrangement allows for full or partial amortization of a bond prior to its maturity. Three sinking fund arrangements are standard, accelerated, and call provision.

The different types of coupon payments are listed below:

- Fixed periodic coupon: A fixed interest is paid either semi-annually or annually.
- Floating rate notes: The coupon payments are not fixed; instead they are linked to a benchmark reference rate such as Libor, short-term Treasury bills, etc.

- Step-up bond: Can be a fixed-rate or floating-rate bond. The coupon rate increases over time.
- Credit-linked Coupon Bonds: The coupon rate changes when the bond's credit rating changes.
- Payment-in-kind Coupon Bonds: The issuer pays interest by issuing additional bonds.
- Deferred Coupon Bonds: Bonds that do not pay a coupon in the initial years, but compensate by paying a higher coupon in the later years.
- Index-Linked Bonds: Coupon and/or principal payments are linked to an index.
- TIPS: Treasury inflation-protected securities issued by the U.S. government; linked to the U.S.CPI.

**LO.f: Describe contingency provisions affecting the timing and/or nature of the cash flows of fixed-income securities and whether such provisions benefit the borrower or the lender.**

A contingency provision is a clause in a legal document that allows for some action if the event or circumstance does occur.

Callable bond: It gives the issuer the right to redeem all or part of the bond before the specified maturity date. Investors face reinvestment risk with callable bonds, as it is not possible to reinvest the proceeds at the previous higher interest rates. When a bond is redeemed early, the issuer has to make the lump-sum payment equal to the present value of future coupon payments and principal. The three types of callable bonds are American call, European call, and Bermuda-style call.

Puttable bond: It gives the bondholder the right to sell the bond back to the issuer at a pre-determined price on specified dates. Puttable bonds offer a lower yield and sell at a higher price relative to otherwise non-puttable bonds. Puttable bonds are beneficial to the bondholder. The three types of puttable bonds are American put, European put, and Bermuda-style put.

Convertible bond: It allows the bondholder the right to exchange the bond for a fixed number of common shares of the issuing company any time before maturity.

Advantages of Convertible Bonds	
From an investor's perspective	From an issuer's perspective
Opportunity to convert into equity if share prices are increasing and participate in upside.	Reduced interest expense; lower yield than otherwise non-convertible bond because of the conversion provision given to bondholders.
Downside protection if shares prices are falling.	Elimination of debt if conversion option is exercised. So they do not have to repay the debt.
	Convertible bonds are usually callable.

Warrant: It is an attached option, not an embedded option. It gives the bondholder the right to buy the underlying common shares at a fixed price called the exercise price any time

before the expiration date.

Contingent Convertible Bonds: These are bonds with contingent write-down provisions. The bonds can be converted into equity contingent to a specific condition.

## Practice Questions

1. ABC Inc. issued bonds 1.5 years ago with an original maturity of 2 years. XYZ Inc. issued bonds 3 months ago with an original maturity of 9 months. Currently, both these bonds have a remaining tenure of 6 months. The bonds would *most likely* be classified as:
  - A. money market securities.
  - B. capital market securities.
  - C. ABC's bonds are capital market securities and XYZ's bonds are money market securities.
2. An organization issued bonds of par value \$1,000 and a coupon rate of 7.5%. The coupons are paid quarterly. The periodic interest payment is:
  - A. \$75, paid once a year.
  - B. \$37.5, paid twice a year.
  - C. \$18.75, paid four times in a year.
3. A bond is trading at a discount, if the bond's price is:
  - A. lower than par value.
  - B. same as par value.
  - C. higher than par value.
4. A legal contract between a bond issuer and the bondholders, which defines the bond's features, the obligations of the issuer, and the rights of the bondholders is *best* described as a bond's:
  - A. covenant.
  - B. indenture.
  - C. debenture.
5. Which of the following is *least likely* a negative bond covenant?
  - A. The issuer will not violate laws or regulations.
  - B. The issuer is prohibited from investing in risky projects.
  - C. The issuer will not sell assets that have been pledged as collateral.
6. Which of the following is *most likely* an external credit enhancement?
  - A. Subordination.
  - B. Excess spread.
  - C. Cash collateral account.
7. An investor in a country with an original issue discount tax provision buys a 10-year zero-coupon bond at a deep discount to its par value. If the investor holds the bond until the maturity date, the increase in the bond's value will *most likely* be treated as:

- A. a capital gain at maturity.
  - B. interest income every year until maturity.
  - C. tax-exempt income.
8. Which of the following statement is *most likely* correct?
- A. Most Eurobonds are bearer bonds and ownership is recorded by name or serial number.
  - B. Most Eurobonds are registered bonds and are subject to less regulation than domestic bonds.
  - C. Most Eurobonds are bearer bonds and bearer bonds are preferred by investors for tax reasons.
9. Taxing authority is the source of payment for which of the following?
- A. Sovereign bonds.
  - B. Supranational bonds.
  - C. Both A and B
10. A zero-coupon bond can *best* be classified as a:
- A. step-up bond.
  - B. credit-linked bond.
  - C. deferred coupon bond.
11. Compared to a partially amortized bond, the first interest payment of an otherwise similar fully amortized bond are:
- A. lower or equal.
  - B. equal.
  - C. higher or equal.
12. Smith issues a bond which has a structure in which a part of the principal is repaid over time and a part is paid at maturity as a balloon payment. Which of the following bonds is he *most likely* to have issued?
- A. fully amortized bond.
  - B. partially amortized bond.
  - C. plain vanilla bond.
13. A bond that is characterized by a fixed nominal principal amount at maturity while coupon payment is linked to some index is best described as a:
- A. Capital indexed bond.
  - B. Interest indexed bond.
  - C. Deferred coupon bond.
-

14. Compared to an otherwise similar option-free bond, which of the following bonds will *most likely* trade at a lower price?
- A. A puttable bond.
  - B. A callable bond.
  - C. A convertible bond.
15. Which of the following *best* describes a convertible bond's conversion value?
- A. Price per share at which the bond may be converted to common stock.
  - B. Par value divided by conversion price.
  - C. Current share price multiplied by conversion ratio.
16. If a bond is callable only once on the call date, it is *most likely* a(n):
- A. American style callable bond.
  - B. European style callable bond.
  - C. Bermuda Style callable bond.



**Solutions**

1. C is correct. A bond with an original maturity of more than one year it is called capital market security. A bond with an original maturity of one year or less is called money market security.
2. C is correct. Coupon rate of 7.5% paid quarterly means  $7.5/4 = 1.875\%$  of par is paid every quarter. On a face value of \$1,000, this results in a periodic interest payment of \$18.75. This amount is paid every quarter i.e. four times a year.
3. A is correct. If a bond's price is lower than its par value, the bond is trading at a discount. If a bond's price is equal to its par value, the bond is trading at par. If a bond's price is higher than its par value, the bond is trading at a premium.
4. B is correct. A bond indenture or trust deed is a contract between a bond issuer and the bondholders, which defines the bond's features, the obligations of the issuer, and the rights of the bondholders.
5. A is correct. Negative covenants are restrictions on actions a bond issuer can take. B and C are examples of restrictions. Complying with laws and regulations is an example of a positive covenant.
6. C is correct. A cash collateral account is an external credit enhancement that allows the issuer to immediately borrow the credit enhancement amount and then invest it. Subordination is an internal credit enhancement, which refers to the ordering of claim priorities for ownership or interest in an asset. Excess spread is an example of an internal credit enhancement.
7. 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 equal to the difference between the bond's par value and its original issue price.
8. C is correct. Most Eurobonds are bearer bonds. The trustee does not keep records of who owns the bonds; only the clearing system knows who the bond owners are. Eurobonds are issued internationally, outside the jurisdiction of any single country and are denoted in currency other than that of the countries in which they trade. They are subject to less regulation than domestic bonds. In the case of bearer bonds, the trustee does not maintain a record of who owns the bonds. That information is recorded in the clearing system. Investors prefer bearer bonds for tax reasons. In the case of registered bonds, records of who owns the bond is maintained using a name or serial number. Bonds in the

national market tend to be registered bonds, while international bonds are usually bearer bonds.

9. A is correct. Taxing authority is the source of payment for sovereign bonds. Sovereign bonds are backed by the “full faith and credit” of the national government and thus by that government’s ability to raise tax revenues and print money. 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. National governments may also act as guarantors for certain bond issues. If additional sources of repayment are needed, the supranational organization can typically call on its members to provide funds.
  10. C is correct. Since 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. In a step-up bond, the coupon increases by specified margins at specified dates. In a credit-linked bond, the coupon changes when the bond’s credit rating changes.
  11. B is correct. The first interest payment is the same for both repayment structures. This is because no principal repayment has been made by the time the first coupon is paid. Except at maturity, the principal repayments are higher for a fully amortized bond than for an otherwise similar partially 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.
  12. B is correct. In a partially amortized a part of the principal is repaid over time and a part is paid at maturity as a balloon payment. A plain vanilla bond, also known as a bullet bond, has the largest repayment of principal. The principal is repaid with time for partially and fully paid amortized bonds. In a fully amortized bond the principal is repaid over time.
  13. B is correct.
    - Interest-indexed bonds: An index-linked coupon is paid during the bond’s life but nominal principal amount at maturity is fixed.
    - Capital-indexed bonds: Fixed coupon rate is paid but it is applied to a principal amount that increases in line with increases in the index during the bond’s life.
    - Bonds with deferred coupons: No coupons are paid in the initial years but higher coupons paid later.
  14. B is correct. Put option and conversion option are benefits to the bondholders, therefore, they will be willing to pay a higher price. A call option is a benefit to the issuer, therefore
-

bondholders demand a lower price.

15. C is correct. The conversion value of a bond is the current share price multiplied by the conversion ratio. A is conversion price. B is conversion ratio.
16. B is correct. A European style callable bond can be called only once on the call date. A Bermuda style callable bond can be called on predetermined dates following the call protection period. An American style callable bond can be called any time after the call protection period.