

# 06

# Valuation of Bonds

Presented by

**Dr Abenet Yohannes, Ph.D. | Financial Management Training Series**



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# Learning Objectives

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By the end of this chapter, participants will be able to:

- Explain the meaning and characteristics of bonds
- Identify major types of bonds
- Describe bondholder and issuer rights
- Explain bond cash flows
- Calculate the value of coupon and zero-coupon bonds
- Explain the relationship between bond prices and interest rates
- Calculate current yield and yield to maturity
- Estimate yield to call and realized return
- Distinguish premium, discount and par bonds
- Measure interest-rate risk using duration
- Explain convexity
- Evaluate credit, inflation, liquidity and reinvestment risks
- Make evidence-based bond investment decisions

# Chapter Roadmap

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This chapter covers:

1. Introduction to bonds
2. Bond features and terminology
3. Types of bonds
4. Bond cash flows
5. Time value of money
6. Bond valuation
7. Bond prices and market interest rates
8. Bond-yield measures
9. Yield to maturity
10. Yield to call
11. Interest-rate risk
12. Duration and convexity
13. Credit and other bond risks
14. Bond investment decisions

# What Is a Bond?

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A bond is a long-term debt instrument through which an issuer borrows money from investors.

The issuer promises to:

- Pay periodic interest
- Repay the principal
- Follow the bond contract
- Meet payment dates
- Comply with agreed conditions

# Bond Financing

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When an organization issues bonds:

- Investors provide funds
- The organization becomes the borrower
- Investors become creditors
- Interest payments are made periodically
- Principal is repaid at maturity

*Unlike shareholders, bondholders generally do not own the organization.*

# Why Organizations Issue Bonds

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Organizations may issue bonds to:

- Finance expansion
- Purchase long-term assets
- Refinance existing debt
- Construct infrastructure
- Fund acquisitions
- Support government expenditure
- Finance public projects
- Diversify financing sources

# Why Investors Buy Bonds

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Investors purchase bonds to:

- Earn regular interest income
- Preserve capital
- Diversify investment portfolios
- Reduce portfolio volatility
- Match future liabilities
- Generate predictable cash flows
- Protect against specific risks
- Earn capital gains

# Bonds vs Stocks

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| Bonds                       | Stocks                        |
|-----------------------------|-------------------------------|
| Represent debt              | Represent ownership           |
| Pay contractual interest    | May pay dividends             |
| Have maturity dates         | Usually have no maturity      |
| Bondholders are creditors   | Shareholders are owners       |
| Lower return variability    | Returns are more variable     |
| Higher claim in liquidation | Residual claim in liquidation |

# Debt Holder vs Equity Holder

## Bondholder

- Receives contractual payments
- Has priority over shareholders
- Usually has no voting rights
- Faces limited return potential
- Focuses on default and interest-rate risk

## Shareholder

- Receives residual returns
- May have voting rights
- Has unlimited upside potential
- Bears greater business risk

# Key Bond Terms

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Important bond terms include:

- Face value
- Par value
- Coupon rate
- Coupon payment
- Maturity date
- Market price
- Required return
- Yield
- Bond indenture
- Credit rating

# Face Value

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Face value is the amount the issuer promises to repay at maturity. It is also called:

- Par value
- Principal
- Redemption value
- Maturity value

*Example: A bond with a face value of ETB 1,000 repays ETB 1,000 at maturity.*

# Coupon Rate

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The coupon rate is the stated annual interest rate applied to the bond's face value.

$$\text{Annual Coupon} = \text{Coupon Rate} \times \text{Face Value}$$

# Coupon Payment Example

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Assume a face value of ETB 1,000 and a coupon rate of 10%.

$$\text{Annual Coupon} = 0.10 \times 1,000$$

$$\text{Annual Coupon} = \text{ETB } 100$$

# Coupon Payment Frequency

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Coupons may be paid:

- Annually
- Semiannually
- Quarterly
- Monthly
- At maturity

*Semiannual coupon payments are common in many bond markets.*

# Maturity Date

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The maturity date is the date on which:

- The final coupon is paid
- The principal is repaid
- The bond contract ends

Bond maturities may be short term, medium term, long term or perpetual.

# Bond Market Price

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The market price is the amount investors currently pay for the bond. The price may be:

- Equal to face value
- Above face value
- Below face value

*Market price changes as interest rates, credit risk and market conditions change.*

# Bond Indenture

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A bond indenture is the legal contract between the issuer and bondholders. It may specify:

- Coupon rate
- Maturity
- Payment dates
- Collateral
- Covenants
- Call provisions
- Conversion rights
- Default procedures

# Bond Covenants

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Covenants are contractual conditions designed to protect bondholders. Examples include:

- Limits on additional borrowing
- Minimum liquidity requirements
- Restrictions on asset sales
- Dividend restrictions
- Reporting requirements
- Maintenance of collateral
- Compliance with financial ratios

# Major Types of Bonds

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Bonds may be classified by:

- Issuer
- Coupon structure
- Security
- Maturity
- Currency
- Embedded options
- Credit quality
- Purpose

# Government Bonds

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Government bonds are issued by national governments to finance:

- Budget deficits
- Infrastructure
- Public services
- Debt refinancing
- Development programmes

*Often considered lower-risk in domestic currency, though not risk-free in every market.*

# Municipal and Public-Sector Bonds

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These bonds may be issued by:

- Regional governments
- Cities
- Public authorities
- State-owned enterprises
- Development institutions

*They often finance infrastructure and public-service projects.*

# Corporate Bonds

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Corporate bonds are issued by companies to finance:

- Expansion
- Asset purchases
- Acquisitions
- Research and development
- Working-capital requirements
- Debt refinancing

*Corporate bonds generally carry more credit risk than government bonds.*

# Secured Bonds

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Secured bonds are backed by identified assets. Possible collateral includes:

- Land
- Buildings
- Equipment
- Financial securities
- Receivables
- Project assets

*Bondholders may have claims over collateral if the issuer defaults.*

# Unsecured Bonds

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Unsecured bonds are supported by the issuer's general creditworthiness rather than specific collateral. They are also known as:

- Debentures
- Unsecured notes

*Their risk depends heavily on the issuer's financial strength.*

# Senior and Subordinated Bonds

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## Senior Bonds

Have priority over subordinated debt during liquidation.

## Subordinated Bonds

Are paid after senior creditors but before shareholders.

*Subordinated bonds generally require higher yields.*

# Fixed-Rate Bonds

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Fixed-rate bonds pay a coupon that remains unchanged throughout the bond's life. Advantages include:

- Predictable income
- Simple valuation
- Stable contractual payments

*Their market values are sensitive to changing interest rates.*

# Floating-Rate Bonds

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Floating-rate bonds pay coupons linked to a reference rate.

$$\text{Coupon Rate} = \text{Reference Rate} + \text{Credit Spread}$$

*Coupon payments adjust periodically.*

# Zero-Coupon Bonds

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Zero-coupon bonds:

- Pay no periodic interest
- Are issued below face value
- Increase in value over time
- Repay face value at maturity

*Investor return comes from the difference between purchase price and maturity value.*

# Callable Bonds

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A callable bond allows the issuer to redeem the bond before maturity. Issuers may call bonds when:

- Market interest rates decline
- Refinancing becomes cheaper
- Excess cash is available
- The financing structure changes

# Puttable Bonds

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A puttable bond allows the investor to require early repayment. This feature protects investors when:

- Interest rates rise
- Credit quality deteriorates
- Better investment opportunities become available

# Convertible Bonds

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Convertible bonds allow investors to exchange bonds for common shares. They combine:

- Fixed-income characteristics
- Equity participation potential
- Lower coupon rates
- Conversion rights

# Inflation-Linked Bonds

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Inflation-linked bonds adjust payments based on an inflation index. Adjustments may apply to:

- Principal
- Coupon payments
- Both principal and coupons

*They help protect purchasing power.*

# Perpetual Bonds

Perpetual bonds:

- Have no fixed maturity date
- Pay interest indefinitely
- Resemble preferred stock
- Are valued as perpetuities

$$P_0 = C / kd$$

# Foreign-Currency Bonds

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Foreign-currency bonds expose investors and issuers to exchange-rate movements. Risks include:

- Currency depreciation
- Currency appreciation
- Conversion restrictions
- Cross-border transfer risk
- Political and regulatory risk

# Bond Cash-Flow Structure

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A conventional bond provides:

- Periodic coupon payments
- Repayment of face value at maturity

*The bond's value is the present value of these expected cash flows.*

## Cash-Flow Timeline

For a five-year annual-coupon bond:

| Year | Cash Flow           |
|------|---------------------|
| 1    | Coupon              |
| 2    | Coupon              |
| 3    | Coupon              |
| 4    | Coupon              |
| 5    | Coupon + Face Value |

## Example Bond Cash Flows

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Assume face value ETB 1,000, coupon rate 8%, maturity 4 years.

$$\text{Annual Coupon} = 0.08 \times 1,000 = \text{ETB } 80$$

Cash flows: Years 1–3 = ETB 80; Year 4 = ETB 1,080.

# Required Return on a Bond

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The required return reflects:

- Time value of money
- Inflation expectations
- Credit risk
- Liquidity risk
- Maturity risk
- Tax considerations
- Market conditions
- Embedded options

# Bond Valuation Principle

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The value of a bond equals the present value of coupon payments plus the present value of the face value.

$$VB = PV(\text{Coupons}) + PV(\text{Face Value})$$

# General Bond-Valuation Formula

$$VB = \sum_{t=1}^n C/(1+kd)^t + F/(1+kd)^n$$

- VB = bond value
- C = coupon payment
- F = face value
- kd = required return
- n = periods to maturity

# Annuity Component

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Coupon payments are normally a fixed annuity.

$$PV(\text{Coupons}) = C \times [ 1 - (1+kd)^{-n} ] / kd$$

# Principal Component

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The face value is a single future payment.

$$PV(\text{Face Value}) = F / (1+kd)^n$$

# Complete Bond Formula

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$$VB = C \times [ 1 - (1+kd)^{-n} ] / kd \\ + F / (1+kd)^n$$

# Annual-Coupon Bond Example

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Assume:

- Face value: ETB 1,000
- Coupon rate: 10%
- Annual coupon: ETB 100
- Maturity: 5 years
- Required return: 12%

## Present Value of Coupons

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$$PV(\text{Coupons}) = 100 \times [ 1 - (1.12)^{-5} ] / 0.12$$

$$PV(\text{Coupons}) \approx \text{ETB } 360.48$$

## Present Value of Face Value

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$$PV(\text{Face Value}) = 1,000 / (1.12)^5$$

$$PV(\text{Face Value}) \approx \text{ETB } 567.43$$

## Total Bond Value

$$VB = 360.48 + 567.43$$

$$VB \approx \text{ETB } 927.91$$

*The bond sells below face value because the required return exceeds the coupon rate.*

# Par Bond

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A bond sells at par when the coupon rate equals the required return.

$\text{Coupon Rate} = \text{Required Return}$

$\text{Bond Price} = \text{Face Value}$

# Discount Bond

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A bond sells below face value when the coupon rate is below the required return.

Coupon Rate < Required Return

*Investors require a price discount to compensate for the below-market coupon.*

# Premium Bond

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A bond sells above face value when the coupon rate is above the required return.

Coupon Rate > Required Return

*Investors pay a premium for the above-market coupon.*

# Price Classification

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| Relationship                  | Bond Price |
|-------------------------------|------------|
| Coupon rate = required return | Par        |
| Coupon rate < required return | Discount   |
| Coupon rate > required return | Premium    |

# Premium Bond Example

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Assume:

- Face value: ETB 1,000
- Coupon rate: 12%
- Required return: 9%
- Maturity: 5 years

*Because the coupon rate is above the required return, the bond should sell above ETB 1,000.*

# Discount Bond Example

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Assume:

- Face value: ETB 1,000
- Coupon rate: 7%
- Required return: 11%
- Maturity: 5 years

*Because the coupon rate is below the required return, the bond should sell below ETB 1,000.*

# Bond Price–Yield Relationship

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Bond prices and market interest rates move in opposite directions.

- Interest rates rise → bond prices fall
- Interest rates fall → bond prices rise

# Why Bond Prices Fall When Rates Rise

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Existing bonds continue paying their original coupons. When new bonds offer higher returns:

- Existing low-coupon bonds become less attractive
- Their prices must fall
- The lower price raises their effective yield

# Why Bond Prices Rise When Rates Fall

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When new bonds offer lower coupons:

- Existing high-coupon bonds become more attractive
- Investors are willing to pay more
- Their market prices rise
- The higher price lowers their effective yield

# Price Convergence at Maturity

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As maturity approaches, a bond's price normally moves toward face value, provided the issuer does not default.

- Discount bonds rise toward par
- Premium bonds fall toward par
- Par bonds remain near face value

*This is known as the pull-to-par effect.*

# Interest-Rate Sensitivity

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Bond prices are more sensitive when:

- Maturity is longer
- Coupon rate is lower
- Required yield is lower
- Cash flows occur further in the future

# Long-Term vs Short-Term Bonds

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Long-term bonds generally experience larger price changes than short-term bonds when market yields change. This occurs because:

- More cash flows occur far in the future
- Future payments are more heavily affected by discount-rate changes

# High-Coupon vs Low-Coupon Bonds

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Low-coupon bonds generally have greater price sensitivity than high-coupon bonds with the same maturity and yield.

*Zero-coupon bonds have particularly high interest-rate sensitivity.*

# Semiannual Bond Adjustments

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For semiannual coupons:

- Divide annual coupon by 2
- Divide annual required return by 2
- Multiply years to maturity by 2

# Semiannual Valuation Formula

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$$VB = \sum_{t=1}^{2n} (C/2)/(1+kd/2)^t + F/(1+kd/2)^{2n}$$

# Semiannual Bond Example

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Assume face value ETB 1,000, annual coupon rate 8%, required return 10%, maturity 4 years.

Adjustments:

- Semiannual coupon: ETB 40
- Periodic yield: 5%
- Number of periods: 8

## Semiannual Bond Value

$$VB = 40 \times [ 1 - (1.05)^{-8} ] / 0.05 + 1,000 / (1.05)^8$$

$$VB \approx \text{ETB } 935.37$$

# Zero-Coupon Bond Formula

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A zero-coupon bond is valued as a single future payment.

$$VB = F / (1+kd)^n$$

## Zero-Coupon Example

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Assume face value ETB 1,000, maturity 5 years, required return 12%.

$$VB = 1,000 / (1.12)^5$$

$$VB \approx \text{ETB } 567.43$$

# Investor Return on a Zero-Coupon Bond

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The investor's return comes from:

- Purchase at a discount
- Gradual price appreciation
- Repayment of face value at maturity

*There are no periodic coupon receipts.*

# Advantages of Zero-Coupon Bonds

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- No reinvestment risk from coupon payments
- Suitable for future financial obligations
- Predictable maturity value
- Useful for long-term saving goals
- Simple cash-flow structure

# Limitations of Zero-Coupon Bonds

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- High price volatility
- No current income
- Greater sensitivity to interest rates
- Possible tax liability before cash receipt
- Significant credit exposure until maturity

# Main Bond-Yield Measures

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Bond returns may be measured using:

- Coupon rate
- Current yield
- Capital-gain yield
- Yield to maturity
- Yield to call
- Holding-period return
- Realized compound yield

# Coupon Rate

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$$\text{Coupon Rate} = (\text{Annual Coupon} / \text{Face Value}) \times 100$$

*The coupon rate is fixed at issuance for a fixed-rate bond.*

# Current Yield

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Current yield measures annual coupon income relative to current market price.

$$\text{Current Yield} = (\text{Annual Coupon} / \text{Market Price}) \times 100$$

## Current Yield Example

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Assume an annual coupon of ETB 90 and a market price of ETB 950.

$$\text{Current Yield} = (90 / 950) \times 100$$

$$\text{Current Yield} = 9.47\%$$

# Limitation of Current Yield

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Current yield ignores:

- Capital gain or loss
- Time value of money
- Maturity value
- Reinvestment of coupons
- Timing of cash flows

*It is not a complete measure of bond return.*

# Capital-Gain Yield

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A discount bond may generate a capital gain as its price approaches face value.

A premium bond may generate a capital loss as its price approaches face value.

# Approximate Yield to Maturity

$$YTM \approx [ C + (F - P)/n ] / [ (F + P)/2 ]$$

- C = annual coupon
- F = face value
- P = market price
- n = years to maturity

## Approximate YTM Example

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Assume coupon ETB 100, face value ETB 1,000, market price ETB 920, maturity 5 years.

$$\text{YTM} \approx [ 100 + (1,000 - 920)/5 ] / [ (1,000 + 920)/2 ]$$

$$\text{YTM} \approx 12.08\%$$

# What Is Yield to Maturity?

Yield to maturity is the discount rate that makes the present value of bond cash flows equal to the current market price.

$$\text{PV of Bond Cash Flows} = \text{Current Market Price}$$

*It is the bond's internal rate of return if held to maturity under specified assumptions.*

## YTM Equation

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$$P_0 = \sum_{t=1}^n C/(1+YTM)^t + F/(1+YTM)^n$$

YTM is normally determined through financial calculators, spreadsheet functions, trial and error, or interpolation.

# YTM Assumptions

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YTM assumes that:

- The bond is held to maturity
- All coupons are paid as promised
- Coupons are reinvested at the YTM
- The issuer does not default
- Transaction costs and taxes are ignored unless included

# YTM and Bond Price

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For a conventional bond:

- Discount bond:  $\text{YTM} > \text{current yield} > \text{coupon rate}$
- Premium bond:  $\text{coupon rate} > \text{current yield} > \text{YTM}$
- Par bond:  $\text{YTM} = \text{current yield} = \text{coupon rate}$

# Discount Bond Yield Relationship

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$$\text{YTM} > \text{Current Yield} > \text{Coupon Rate}$$

The investor receives coupon income plus a capital gain as price moves toward par.

# Premium Bond Yield Relationship

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$$\text{Coupon Rate} > \text{Current Yield} > \text{YTM}$$

The investor receives high coupon income but experiences a capital loss as price moves toward par.

# What Is Yield to Call?

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Yield to call is the expected return if a callable bond is redeemed before maturity. It uses:

- Current market price
- Coupon payments until call date
- Call price
- Time until call

# Yield-to-Call Formula

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$$P_0 = \sum_{t=1}^{nc} C/(1+YTC)^t + CP/(1+YTC)^{nc}$$

- CP = call price
- nc = periods until call

# When Is a Bond Likely to Be Called?

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A callable bond is more likely to be called when:

- Market yields fall
- The bond's coupon is above current rates
- Refinancing savings are substantial
- The call-protection period has ended
- The issuer remains financially capable

# Yield to Worst

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Yield to worst is the lowest expected yield among possible repayment dates, assuming no default. It may compare:

- Yield to maturity
- Yield to first call
- Yield to later call dates
- Yield to put

*It provides a conservative return estimate.*

# Bond Holding-Period Return

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Holding-period return measures the return earned over the actual investment period.

$$\text{HPR} = ( \text{Coupon} + \text{Selling Price} - \text{Purchase Price} ) / \text{Purchase Price}$$

## Holding-Period Return Example

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An investor purchases a bond for ETB 950, receives an ETB 90 coupon, and sells it for ETB 980.

$$\text{HPR} = ( 90 + 980 - 950 ) / 950$$

$$\text{HPR} = 12.63\%$$

# Realized Return

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Actual bond return depends on:

- Purchase price
- Coupon receipts
- Reinvestment rates
- Selling price
- Holding period
- Default experience
- Transaction costs
- Taxes

*Realized return may differ from YTM.*

# Meaning of Interest-Rate Risk

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Interest-rate risk is the risk that a bond's market value will change because market yields change. It includes:

- Price risk
- Reinvestment risk

# Price Risk

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Price risk is the risk that bond prices will fall when market interest rates rise. It is greater for:

- Long maturities
- Low coupons
- Low-yield bonds
- Zero-coupon bonds

# Reinvestment Risk

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Reinvestment risk is the risk that coupon payments will be reinvested at lower rates. It is greater for:

- High-coupon bonds
- Callable bonds
- Shorter holding horizons
- Declining interest-rate environments

## Price Risk vs Reinvestment Risk

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| Price Risk                 | Reinvestment Risk                |
|----------------------------|----------------------------------|
| Higher for long maturities | Higher for large coupon payments |
| Matters when selling early | Matters when reinvesting coupons |
| Rises when rates increase  | Rises when rates decrease        |
| Affects market value       | Affects future accumulated value |

# What Is Duration?

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Duration measures the weighted average time required to receive a bond's cash flows.

*It also indicates the bond's sensitivity to interest-rate changes.*

# Macauley Duration

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$$DM = [ \sum t \times PV(CF_t) ] / \text{Bond Price}$$

*Cash flows received later receive greater time weights.*

# Modified Duration

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Modified Duration estimates the percentage price change for a small change in yield.

$$D_{\text{mod}} = DM / (1 + y)$$

$$D_{\text{mod}} = DM / (1 + y/m)$$

# Duration Price Estimate

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$$\Delta P / P \approx - D_{\text{mod}} \times \Delta y$$

*The negative sign reflects the inverse relationship between bond prices and yields.*

## Duration Example

Assume a modified duration of 6 and a yield increase of 1%.

$$\Delta P / P \approx - 6 \times 0.01$$

$$\Delta P / P \approx - 6\%$$

*The bond price is expected to decline by approximately 6%.*

# Factors Affecting Duration

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Duration is generally:

- Higher for longer-maturity bonds
- Higher for lower-coupon bonds
- Higher for lower-yield bonds
- Highest for zero-coupon bonds of the same maturity
- Lower when cash flows are received earlier

# Duration of a Zero-Coupon Bond

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For a zero-coupon bond, all cash flow is received at maturity.

**Macauley Duration = Time to Maturity**

# Using Duration

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Duration can help investors to:

- Measure interest-rate exposure
- Compare bonds
- Manage bond portfolios
- Estimate price changes
- Match assets with liabilities
- Immunize future obligations

# What Is Convexity?

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Convexity measures the curvature in the relationship between bond prices and yields.

Duration assumes an approximately straight-line relationship.

*Convexity improves the estimate when yield changes are large.*

# Why Convexity Matters

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Because the price-yield relationship is curved:

- Price increases from falling yields may be larger
- Price decreases from rising yields may be smaller
- Duration alone may underestimate price changes

# Duration and Convexity Estimate

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$$\Delta P / P \approx - D_{\text{mod}} \Delta y + \frac{1}{2} C (\Delta y)^2$$

*Where C represents convexity.*

# Positive Convexity

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Most conventional bonds demonstrate positive convexity. For similar duration and yield, investors generally prefer greater positive convexity because it provides:

- Greater price gains when yields fall
- Smaller price losses when yields rise

# Negative Convexity

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Callable bonds may display negative convexity when yields fall. This occurs because:

- Bond prices stop rising normally
- The likelihood of early redemption increases
- Investors may lose high coupon payments
- Reinvestment occurs at lower rates

# Meaning of Credit Risk

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Credit risk is the possibility that the issuer will fail to:

- Pay interest
- Repay principal
- Comply with bond conditions
- Maintain financial strength

# Components of Credit Risk

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Credit risk includes:

- Default risk
- Downgrade risk
- Credit-spread risk
- Recovery risk
- Counterparty risk
- Sovereign risk

# Bond Credit Ratings

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Credit-rating agencies evaluate the issuer's ability to meet obligations. Ratings often distinguish:

- Investment-grade bonds
- Speculative-grade bonds
- Bonds in default

*Ratings are opinions, not guarantees.*

# Investment Grade vs Speculative Grade

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## Investment Grade

- Lower expected default risk
- Lower required yield
- Greater institutional demand

## Speculative Grade

- Higher default risk
- Higher required yield
- Greater price volatility
- Also called high-yield bonds

# Credit Spread

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A credit spread is the additional yield above a lower-risk benchmark.

$$\text{Credit Spread} = \text{Corporate Bond Yield} - \text{Benchmark Yield}$$

*A wider spread generally indicates higher perceived credit risk.*

# Factors Affecting Credit Quality

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- Profitability
- Cash-flow stability
- Debt level
- Interest coverage
- Liquidity
- Asset quality
- Industry conditions
- Management quality
- Governance
- Economic environment

# Interest-Coverage Ratio

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$$\text{Interest Coverage} = \text{EBIT} / \text{Interest Expense}$$

*A higher ratio indicates greater ability to meet interest obligations.*

# Debt Ratio

$$\text{Debt Ratio} = \text{Total Debt} / \text{Total Assets}$$

High leverage may increase:

- Default risk
- Required yield
- Credit spread
- Refinancing risk

# Major Bond Risks

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Bond investors should assess:

- Interest-rate risk
- Credit risk
- Inflation risk
- Liquidity risk
- Reinvestment risk
- Call risk
- Currency risk
- Political risk
- Event risk

# Inflation Risk

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Inflation reduces the purchasing power of fixed coupon and principal payments. When expected inflation rises:

- Investors demand higher yields
- Existing bond prices may fall
- Real investment returns decline

# Liquidity Risk

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Liquidity risk is the risk that a bond cannot be sold quickly at a fair price. It may be caused by:

- Limited trading
- Small issue size
- Weak market infrastructure
- Credit concerns
- Market stress
- Limited investor demand

# Call Risk

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Call risk occurs when an issuer redeems a bond earlier than expected. Investors may face:

- Loss of future high coupons
- Reinvestment at lower rates
- Limited price appreciation
- Uncertainty about investment horizon

# Currency Risk

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Currency risk arises when bond payments are denominated in a foreign currency.

*Investor returns may decline if the foreign currency weakens against the investor's home currency.*

# Event Risk

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Event risk includes unexpected developments such as:

- Corporate takeover
- Major litigation
- Natural disaster
- Regulatory action
- Political crisis
- Fraud
- Cyberattack
- Sudden restructuring

# What Is the Yield Curve?

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The yield curve shows the relationship between bond yields and time to maturity.

*It is normally based on bonds of similar credit quality.*

# Normal Yield Curve

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A normal yield curve slopes upward. Long-term yields exceed short-term yields because investors may require compensation for:

- Inflation uncertainty
- Interest-rate risk
- Liquidity risk
- Longer capital commitment

# Inverted Yield Curve

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An inverted yield curve slopes downward. Short-term yields exceed long-term yields. It may reflect expectations of:

- Lower future interest rates
- Weaker economic growth
- Tighter current monetary conditions

# Flat Yield Curve

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A flat yield curve indicates that short- and long-term yields are similar. It may occur during transitions in:

- Monetary policy
- Inflation expectations
- Economic growth expectations
- Investor risk preferences

# Yield-Curve Uses

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The yield curve helps investors and managers to:

- Compare maturities
- Forecast interest-rate expectations
- Price debt securities
- Select borrowing terms
- Assess economic conditions
- Manage portfolio duration

# Practical Exercise: Evaluate a Bond Investment

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Participants will:

- Calculate coupon payments
- Determine bond price
- Identify premium or discount status
- Calculate current yield
- Estimate YTM
- Assess interest-rate risk
- Evaluate credit risk
- Make an investment recommendation

# Exercise Scenario

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A company has issued a bond with:

- Face value: ETB 1,000
- Coupon rate: 9%
- Annual coupon payments
- Maturity: 6 years
- Required market return: 11%
- Current market price: ETB 920
- Credit rating: medium investment grade

## Step 1 — Calculate Annual Coupon

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$$C = 9\% \times \text{ETB } 1,000$$

$$C = \text{ETB } 90$$

*The investor receives ETB 90 annually.*

## Step 2 — Calculate Intrinsic Value

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$$VB = 90 \times [ 1 - (1.11)^{-6} ] / 0.11 + 1,000 / (1.11)^6$$

$$VB \approx \text{ETB } 915.39$$

## Step 3 — Compare Price and Value

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- Intrinsic value: approximately ETB 915.39
- Market price: ETB 920
- Difference: ETB 4.61

*The bond appears approximately fairly valued, subject to assumptions and transaction costs.*

## Step 4 — Identify Bond Classification

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Coupon Rate = 9%

Required Return = 11%

*Because the coupon rate is below the required return, the bond is a discount bond.*

## Step 5 — Calculate Current Yield

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$$\text{Current Yield} = (90 / 920) \times 100$$

$$\text{Current Yield} = 9.78\%$$

## Step 6 — Approximate YTM

$$\text{YTM} \approx [ 90 + (1,000 - 920)/6 ] / [ (1,000 + 920)/2 ]$$

$$\text{YTM} \approx 10.76\%$$

*The exact YTM would be determined using a financial calculator or spreadsheet.*

## Step 7 — Interest-Rate Scenario

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Assume the required market return falls from 11% to 8%. The bond's 9% coupon becomes more attractive. Expected result:

- Bond value rises
- The bond may sell at a premium
- Yield declines
- Investor may earn a capital gain

# Step 8 — Risk Assessment

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Participants should assess:

- Creditworthiness
- Interest-rate outlook
- Liquidity
- Inflation
- Maturity
- Call provisions
- Portfolio objectives
- Alternative investments

# Group Recommendation

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Each group should present:

1. Coupon amount
2. Intrinsic value
3. Market-price comparison
4. Current yield
5. Approximate YTM
6. Major investment risks
7. Buy, hold or reject recommendation
8. Conditions that could change the decision

# Common Bond-Valuation Mistakes

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- Using the coupon rate as the discount rate
- Ignoring payment frequency
- Forgetting principal repayment
- Confusing face value with market price
- Ignoring accrued interest
- Treating YTM as a guaranteed return
- Ignoring call provisions
- Ignoring credit and liquidity risk
- Using annual rates with semiannual periods
- Failing to consider taxes and inflation

# Bond-Analysis Checklist

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Before investing, confirm:

- Issuer identity
- Face value
- Coupon rate
- Payment frequency
- Maturity
- Market price
- Required return
- Yield to maturity
- Call or put provisions
- Credit rating
- Duration
- Liquidity
- Tax treatment
- Currency exposure

# Knowledge Check

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1. What does a bond represent?
2. How does a bond differ from common stock?
3. What is face value?
4. How is the coupon payment calculated?
5. Why do bond prices fall when interest rates rise?
6. What distinguishes a premium bond from a discount bond?
7. How is current yield calculated?
8. What does YTM represent?
9. What is duration?
10. What are the major risks of bond investment?

# Knowledge Check Answers

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1. A contractual debt obligation
2. A bond represents debt; common stock represents ownership
3. The principal repaid at maturity
4. Coupon rate multiplied by face value
5. Existing coupons become less attractive relative to new market rates
6. Premium bonds have coupon rates above required yields; discount bonds have lower coupon rates
7. Annual coupon divided by market price
8. The discount rate equating bond price with expected cash flows
9. A measure of cash-flow timing and interest-rate sensitivity
10. Interest-rate, credit, inflation, liquidity, reinvestment, call and currency risks

# Action Plan

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Select one bond and assess:

- Issuer
- Face value
- Coupon rate
- Maturity
- Current price
- Current yield
- Yield to maturity
- Credit quality
- Interest-rate risk
- Liquidity
- Embedded options
- Final investment recommendation

# Chapter Summary

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- Bonds represent contractual debt obligations
- Bondholders receive coupons and principal repayment
- Bond value equals the present value of expected cash flows
- Required return determines the appropriate discount rate
- Bond prices and market yields move in opposite directions
- Bonds may sell at par, at a discount or at a premium
- Current yield ignores capital gains and time value
- YTM provides a more comprehensive return measure
- Duration measures interest-rate sensitivity
- Convexity improves price-change estimates
- Credit, inflation, liquidity and reinvestment risks must be assessed
- Bond valuation requires quantitative and qualitative analysis

## Key Message

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**Bond valuation is not limited to discounting coupons and principal.**

A sound decision combines:

**Cash Flows → Market Yield → Credit Quality → Interest-Rate Risk →  
Contractual Features → Investment Objectives**

# Closing Message

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## **Effective bond valuation requires more than calculating a price.**

It requires understanding the issuer's ability to pay, the effect of interest-rate changes, the timing of cash flows and the risks that determine whether the promised return can actually be achieved.

# THANK YOU

*Questions and Discussion*

**Dr Abenet Yohannes, Ph.D.**

Email: [abenetyohannes@gmail.com](mailto:abenetyohannes@gmail.com)

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