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# CFA一级培训项目

## Fixed Income



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# 计算知识点

1. TIPS
2. Valuation with a single yield
3. The value change attributable to the passage of time
4. Arbitrage-free bond valuation
5. Accrued interest and full price
6. Matrix pricing
7. Floating rate notes valuation
8. Discount rate, add on yield, and BEY
9. Spot rate and forward rate
10. Reinvestment income & annualized HPR
11. Duration: Macaulay duration, Modified duration, Approximate modified duration, Effective duration
12. Money duration & PVBP
13. Portfolio duration
14. Convexity: Approximate convexity & Effective convexity
15. Price change based on duration and convexity

# Framework of Fixed Income

## ➤ Study Session 15 — Basic Concepts

- R52 Fixed-Income Securities: Defining Elements
- R53 Fixed-Income Markets: Issuance, Trading, and Funding
- R54 Introduction to Fixed-Income Valuation
- R55 Introduction to Asset-Backed Securities

## ➤ Study Session 16 — Analysis of Risk

- R56 Understanding Fixed-Income Risk and Return
- R57 Fundamentals of Credit Analysis

# Framework

- Basic features of a bond
- Bond indenture
  - Legal information
  - Collateral
  - Credit enhancements
  - Covenants
  - Tax
- Structure of a bond's cash flows
  - Principal repayment structures
  - Coupon payment structures
- Bonds with contingency provisions
  - Callable bonds
  - Puttable bonds
  - Convertible bonds

# Basic features of a bond

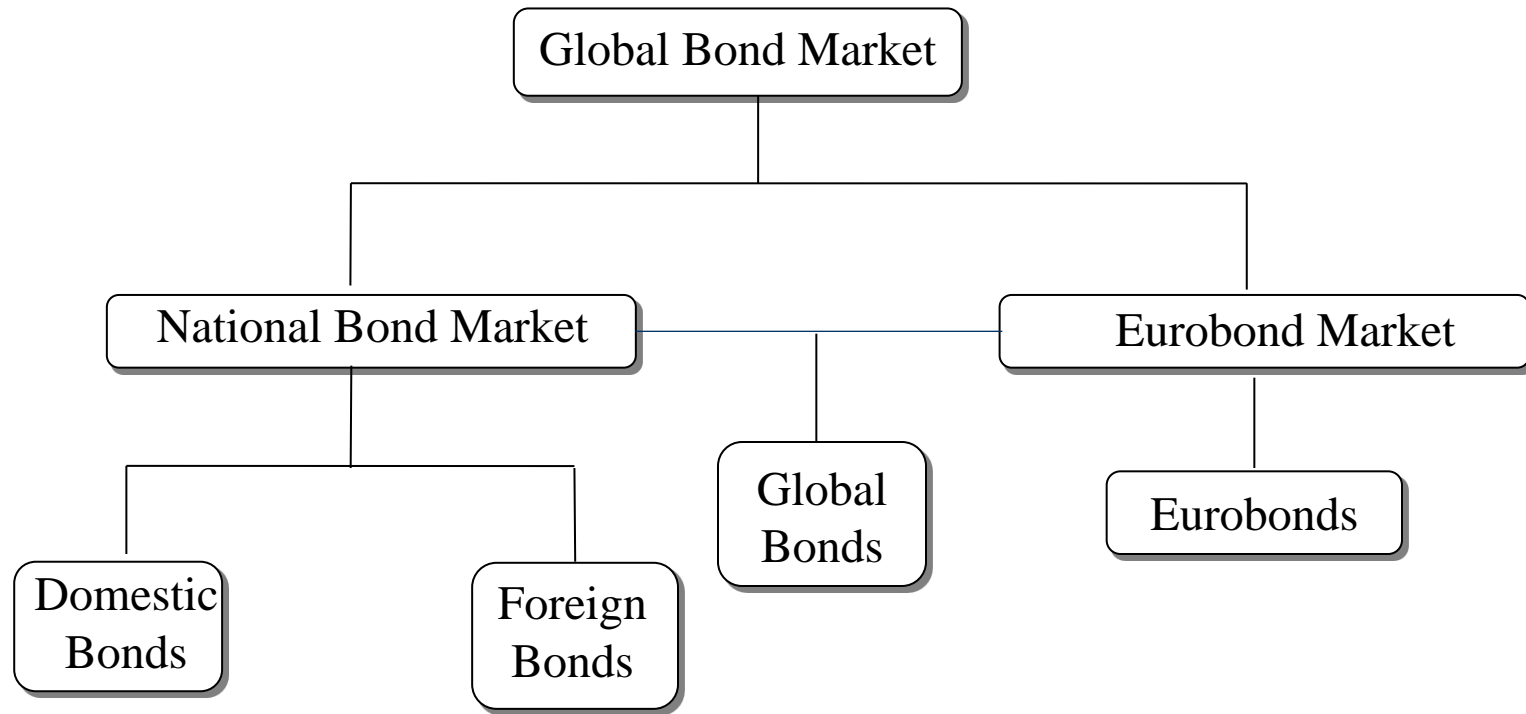
## ➤ Basic features of a bond

- **Issuer/borrower:** 债券发行人，实际上为资金需求者
- **Bondholder:** 债券持有人，实际上为资金的供给者
- **Maturity date:** the date on which the principal is to be repaid
- **Term to maturity(tenor):** the time remaining until maturity once a bond has been issued
- **Par value//face value/ maturity value:** 面值，多数债券面值为1000
- **Coupon rate:** 息票率，决定每期支付的利息

# Bond Market

2015.06 (1)

## ➤ Sectors of the bond market



# Basic Features of A Bond

- **Trust deed:** legal contract that describes the form of the bond, the obligations of the issuer, and the rights of the bondholders.
  - In the United states and Canada, it is called **bond indenture**.
  - The indenture is written in the name of the issuer and references the features of the bond issue
- Other legal and regulatory issue addressed in a trust deed include:
  - **Legal information** about the entities issuing the bond
  - Any assets(**collateral**) pledged to support repayment of the bond.
  - Any additional features that increase the probability of repayment (**credit enhancements**)
  - **Covenants**
  - **Tax**

# Legal and Regulatory Issues Addressed in a Trust Deed

## ➤ Legal information about issuing entities

- Sovereign bonds: issued by the treasury of the issuing country.
- Corporate bonds: issued by well-known corporation, by a subsidiary, or by a holding company.
- **Securitized bonds:** issued by a separate legal entity created for the purpose of owning specific assets which is called special purpose entities(SPEs) in U.S, and special purpose vehicles(SPVs) in Europe.
  - ✓ SPVs is bankruptcy remote because the assets can provide cash flows to support the payment of the bond even if the company defaults.
  - ✓ The transfer of assets by the sponsor is considered a legal sale; once the assets have been securitized, the sponsor no longer has ownership rights.
  - ✓ Any party making claims following the bankruptcy of the sponsor would be unable to recover the assets or their proceeds.



# Legal and Regulatory Issues Addressed in a Trust Deed

➤ Source of repayment proceeds:

Types of bond	Source of repayment
Supranational organizations	<ul style="list-style-type: none"><li>• repayment of previous loans</li><li>• paid-in capital from its members</li></ul>
Sovereign bonds	<ul style="list-style-type: none"><li>• Tax revenues</li><li>• Print money</li></ul>
Non-sovereign debt	<ul style="list-style-type: none"><li>• General taxing authority of issuer</li><li>• Cash flows of the financed project (revenues)</li><li>• Special taxes or fees</li></ul>
Corporate bonds	<ul style="list-style-type: none"><li>• Cash flows from operations</li></ul>
Securitizations	<ul style="list-style-type: none"><li>• Cash flows generated by one or more underlying financial assets.</li></ul>

# Legal and Regulatory Issues Addressed in a Trust Deed

➤ **Asset or collateral backing:** a way to reduce credit risk.

- Unsecured bonds: represent a claim to the overall assets and cash flows of issuer.
- Secured bonds: backed by a claim to a specific assets of a corporation.
  - ✓ Assets pledged to support a bond issue are referred to collateral
- Unsecured bonds are paid after secured bonds in the event of default.
- In many jurisdictions, debentures are unsecured bonds, with no collateral backing assigned to the bondholders.

➤ **Types of collateral backing:**

Types of bond	Collateral backing
Collateral trust bonds	• Financial assets
Equipment trust certificates	• Specific types of equipment or physical assets (e.g. railroad cars, oil drilling)
Mortgage-backed securities (MBS)	• Mortgage loans
Covered bond	• A segregated pool of assets called a “covered pool”

# Legal and Regulatory Issues Addressed in a Trust Deed

➤ **Credit enhancement:** a variety of provisions used to reduce the credit risk of a bond issue.

● **Internal credit enhancement:**

- ✓ **Overcollateralization:** the collateral pledged has a value greater than the par value of the debt issued
- ✓ **Excess spread:** the yield on the financial assets supporting the debt is greater than the yield promised on the bonds issued.
- ✓ Divide a bond into **tranches** with different seniority of claims: any losses of assets supporting a securitized bond are first absorbed by the bonds with the lowest seniority, then the bonds with the next-lowest priority of claims.——waterfall structure

# Legal and Regulatory Issues Addressed in a Trust Deed

## ● External credit enhancement:

- ✓ Surety bond: issued by insurance companies and are a promise to make up any shortfall in the cash available to service the debt.
- ✓ Bank guarantee: similar to surety bond, the major difference is that it issued by a bank.
- ✓ Letter of credit: a promise to lend money to the issuing entity if it does not have enough cash to make the promised payments on the covered debt.

## ➤ Limitation of External credit enhancement:

- while external credit enhancements increase the credit quality of debt issues and decrease the yields, deterioration of credit quality of the guarantor will also reduce the credit quality of the covered issue.
- Surety bonds, bank guarantees, and letters of credit expose the investor to third-party (or counterparty) risk, the possibility that a guarantor cannot meet its obligations.

- A **cash collateral account** mitigates this concern because the issuer immediately borrows the credit-enhancement amount and then invests that amount, usually in highly rated short-term commercial paper. Because this is an actual deposit of cash rather than a pledge of cash, a downgrade of the cash collateral account provider will not necessarily result in a downgrade of the bond issue backed by that provider.

# Legal and Regulatory Issues Addressed in a Trust Deed

## ➤ Affirmative VS. negative covenants

- Affirmative covenants: are typically administrative in nature.
  - ✓ Frequently used affirmative covenants include what the issuer will do with the proceeds from the bond issue and the promise of making the contractual payments.
- Negative covenants: frequently costly and do materially constrain the issuer's potential business decisions.
  - ✓ The purpose of negative covenants is to protect bondholders from such problems as the dilution of their claims, asset withdrawals or substitutions, and suboptimal investments by the issuer.

# Taxation of Bond Income

## ➤ Tax consideration:

- Interest income paid to bondholders is taxed as ordinary income at the same rate as wage and salary income.
  - ✓ Municipal debts is most often exempt from federal income tax and from the income tax of the state.
  - ✓ The tax status of bond income depend on where the bond is issued and traded.
- Capital gain or loss: due to sell a coupon bond prior to maturity
  - ✓ Capital gains are taxed at a lower rate than ordinary income.
  - ✓ Long-term CG: capital gains on the sale of an asset that has been owned for more than the minimum amount of time, which is taxed at an even lower rate.
- Original issue discount (OID) bonds: a portion of the discount from par at issuance is treated as taxable interest income each year.
  - ✓ This tax treatment also allows that the tax basis of the OID bond is increased each year by the amount of interest income recognized, so there is no additional capital gains tax liability at maturity.
  - ✓ Pure-discount bonds: a portion of the discount from par at issuance is treated as taxable interest income.
- Premium bonds: part of the premium can be used to reduced the taxable portion of interest payments.

# Cash Flow Structure

2015.06 (1)

## ➤ Principal repayment structures

- Plain vanilla bond/bullet bonds: periodic interest payments and principal is paid at maturity.
  - ✓ Balloon payment
- Amortizing loan: periodic payments include both interest and some repayment of principal.
  - ✓ Fully amortizing: principal is fully paid off when the last periodic payment is made.
  - ✓ Partially amortizing: the final payment includes just the remaining unamortized principal amount at bond maturity.

# Cash Flow Structure

2015.06 (1)

- The sinking fund provision is used to reduce the credit risk of the issuer.
- Sinking fund provision: requires the issuer to retire a portion of a bond issue at specific times during the bonds' life.
  - Originally, a sinking fund was a specified cash reserve that was segregated from the rest of the issuer's business for the purpose of repaying the principal.
  - More generally today, a sinking fund arrangement specifies the portion of the bond's principal outstanding, perhaps 5%, that must be repaid each year throughout the bond's life or after a specified date.
  - Advantages: less credit risk due to the periodic redemptions of the principal
  - Disadvantages: more reinvestment risk. when interest rate decreases, the market price is greater than the redemption price
    - ✓ First, investors face reinvestment risk, the risk associated with having to reinvest cash flows at an interest rate that may be lower than the current yield to maturity.
    - ✓ Another potential disadvantage for investors occurs if the issuer has the option to repurchase bonds at below market prices.



# Cash Flow Structure

2014.06 (1)

## ➤ Coupon payment structures

- Floating-rate notes
- Deferred coupon bonds
- Step-up coupon bonds
- Credit-linked coupon bonds
- Payment-in-kind coupon bonds
- Index-linked bonds 2014.12 (1)

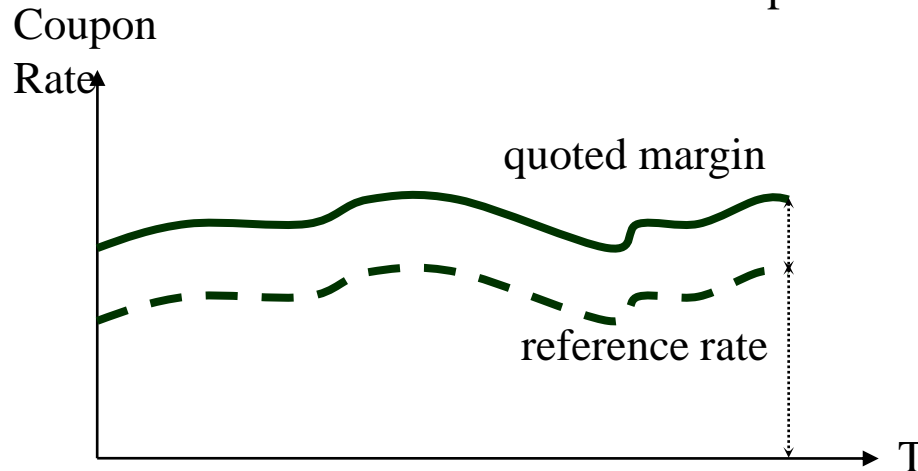
# Cash Flow Structure

2015.12 (1) 2015.06 (1)

## Coupon payment structures

### Floating-Rate Notes (FRN)

$$\text{Coupon rate} = \boxed{\text{reference rate}} \pm \boxed{\text{quoted margin}}$$



➤ Such as:

- LIBOR;
- U.S. Treasury yield

- It is a constant value.
- It is often quoted in basis point.
- Occasionally, the spread is not fixed, called variable-rate note.

- The coupon rate determined at the coupon reset date is the rate that the issuer promises to pay at the **next** coupon date.
  - The new 1-year rate at that time will determine the rate of interest paid at the end of the next year. Most floaters pay quarterly and are based on a quarterly (90-day) reference rate.
  - The reference rate must match the frequency with which the coupon rate on the bond is reset.

# Cash Flow Structure

## ➤ Cap and floor

- The upper limit is called the cap.
- The lower limit is called the floor.
- When a floating-rate security has both a upper limit and a lower limit, the feature is called a collar.

## ➤ **Inverse floaters** (also called reverse floaters) have coupon rates that move in the opposite direction from the change in the reference rate.

- When the reference rate increases, the coupon rate decreases and vice versa.

# Cash Flow Structure

➤ TIPS: pay semiannual coupons, at maturity:

- If adjusted par value (per bond) is greater than \$1,000 at maturity, the holder receives the adjusted par value as the maturity payment.
- If the adjusted par value is less than \$1,000 (due to deflation), holders receive \$1,000 at maturity as this is the minimum repayment amount.

$$\text{TIPS coupon payment} = \text{inflation-adjusted par value} \times \frac{\text{stated coupon rate}}{2}$$

# Bonds with Embedded Options

2015.12 (2) 2015.06 (1)

2014.12 (1) 2014.06 (1)

- **Call provisions** are **beneficial to the issuer**.
  - Callable bond offers a higher yield (lower price) than identical noncallable bond
    - ✓ Value callable bond = value of identical noncallable bond- call option value
- If interest rates fall
  - Issuer can retire the bond, and replace it with lower coupon bonds.
- Three styles of exercise for callable bonds:
  - American style: can be called anytime after the first call date.
  - European style: can only be called on the call date specified.
  - Bermuda style: can be called on specified dates after the first call date, often on coupon payment dates.
- Reinvestment risk about callable bond
- The price appreciation of callable bond is limited.

# Bonds with Embedded Options

- Putable bonds are beneficial to the bondholders.
  - If interest rates rise
    - ✓ The bondholders can sell the bond back to the issuer and get cash.
    - ✓ When the bond is put, the proceeds can be reinvested at a higher interest rate.
  - Putable bonds have a lower yield and higher price than similar non-putable bonds.
    - ✓ Value of putable bonds = value of an identical nonputable bonds + put option value.

# Bonds with Embedded Options

2014.12 (1)

- Convertible bonds are beneficial to the bondholders.
- Key terms of conversion provision:
  - Conversion price: share price when the convertible bond can be converted into shares.
  - Conversion ratio: the number of common shares each bond can be converted into.
    - ✓  $\text{Conversion ratio} = \text{par value} / \text{conversion price}$
  - Conversion value: value of conversion bond if converted right now.
    - ✓  $\text{Conversion value} = \text{current share} * \text{conversion ratio}$
  - Conversion premium: difference between the convertible bond's price and conversion value
  - Conversion parity:
    - ✓  $\text{Conversion value} = \text{convertible bond's price}$
    - ✓ Above parity:  $\text{conversion value} > \text{convertible bond's price}$
    - ✓ Below parity:  $\text{conversion value} < \text{convertible bond's price}$

# Bonds with Embedded Options

2014.06 (1)

Embedded options favor the **issuers**:

- The right to call the issue.
- The prepayment option.
- Accelerated sinking fund provision.
- The cap on a floater.

Embedded options favor the **bondholders**:

- Conversion provisions.
- The put option.
- The floor on a floater.



# Framework of Fixed Income

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# Framework

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- Classification of fixed-income markets
- Issuing & Trading
- Funding

# Classification of Global Fixed-Income Markets

- By type of issuer:
  - Government and government-related sector
  - Corporate sector
    - ✓ Financial company
    - ✓ Non-financial company
  - Securitized sector
- By credit quality:
  - Investment grade
    - ✓ Baa3 or above by Moody's Investors Service
    - ✓ BBB- or above by Standard & Poor's (S&P) and Fitch Ratings
  - Non-investment grade/high yield
- By original maturity
- By coupon structure
- By currency
- By geography

# Primary Market

2014.12 (1)

## ➤ Primary market: sales of newly issued bonds

- **Public offering:**

- ✓ **Underwritten offering:** with the investment bank or syndicate purchasing the entire issue and selling the bonds to dealers.
- ✓ **Best efforts offering:** investment bank sells the bonds on a commission basis and do not commit to purchase the whole issue.
- ✓ Auction
- ✓ Shelf registration

- **Private placement:** sale of an entire issue to a qualified investor or a group of investors, which are typically large institutions.

## ➤ Secondary markets: trade of previously issued bonds.

- **Exchange market:** transaction must obey the rules imposed by the exchange.
- **OTC Dealer Market** (largest): dealers post bid and ask price.
  - ✓ Spread between bid and ask prices are narrower (wider) for liquid (less liquid) issues
- Electronic Trading Network (growth)

# Characteristics of Different Kinds of Bonds

- **Sovereign bonds:** issued by national governments and backed by their tax power.
  - High credit ratings and essentially free of default risk. 2014.06 (1)
  - Denominated in the local currency or a foreign currency.
- **Nonsovereign government bonds:** issued by governments below the national level.
  - High credit quality, but lower than sovereign bonds
- **Municipal bond (in the U.S.)**
  - **GO (general obligation)/Tax-Backed Debt :** Support by taxing power of local government
    - ✓ Almost no credit risk
    - ✓ Require voter approval
  - **Revenue Bonds**
    - ✓ Supported only through revenues generated by projects.
    - ✓ Involve more risk, provide higher yield.
- **Agency/quasi-government bonds:** issued by entities created by national government and may be explicitly or implicitly backed by government. 2014.12 (1)

# Types of Corporation Debts

2015.06 (1)

2014.06 (1)

- **Commercial paper:** *short term, unsecured, low rate* (issued by corporations of high credit quality) debt.
- Exempt from registration, *directly placed* (sold directly by issuer) or *dealer placed* (sold to investor through agents/brokers).
  - There is very *little secondary trading* of commercial paper.
  - *Reissued or rolled over* when it matures.
  - **Rollover risk:** the risk that a company will not be able to sell new commercial paper to replace maturing paper.
  - **U.S commercial paper Vs. Euro-commercial paper**

Feature	U.S commercial paper	Eurocommercial paper
Currency	U.S dollar	Any currency
Maturity	Overnight to 270 days	Overnight to 364 days
Interest	Discount basis (pure discount security)	Interest-bearing basis (add-on yield)
Settlement	T+0	T+2
Negotiable	Can be sold to another	Can be sold to another

# Types of Corporation Debts

## ➤ Corporate bonds

- Serial bond issue: with several maturity dates (known at issuance) and can be redeemed periodically.
- Term maturity structure: all the bonds maturing on the same date.

## ➤ Medium-term notes (MTNs): 2015.06 (1)

- Various maturities(9 months to 100 years)
- Can be structured to meet an institution's specifications.
  - ✓ E.g. structured security: combination of the derivative and notes

# Repurchase Agreement

2015.06 (1)

2014.12 (1)

- **Repurchase (repo) Agreement:** an institution sells a security with a commitment to buy it back at a later date at a specified price.
  - Repurchase agreements are not regulated by the Federal Reserve.
  - Collateral position of the lender in a repo is better in the event of bankruptcy of the dealer. (liquidity)
- **Reverse repo agreement:** taking the opposite side of a repurchase transaction, lending funds by buying the collateral security.
- **Repo rate:** is the interest rate on a repurchase agreement. The repo rate is lower when:
  - Repo term is shorter
  - Credit quality of the collateral security is higher
  - Collateral security is delivered to the lender
  - Interest rate for alternative sources of funds are lower
- **Repo margin/hairstcut:** the difference between the market value of the security used as collateral and the value of the loan. The rope margin is lower when:
  - Repo term is shorter
  - Credit quality of the collateral security is higher
  - Credit quality of the borrower is higher
  - Collateral security is in high demand or low supply.



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# Framework

- Bond valuation
  - Bond pricing with a market discount rate
  - The value of a zero-coupon bond
- Yield-to-maturity
- The value change attributable to the passage of time
- Pricing bonds with spot rate
- Full price, clean price, accrued interest
- Matrix pricing
- Yield measure
  - Yield measures for fixed-rate bonds
  - Yield measures for floating-rate notes
  - Yield measures for money market instruments
- Yield curve
- Yield spread

# Yield to Maturity (YTM)

2014.12 (1)

2014.06 (1)

- Internal rate of return, implied market discount rate
- Critical assumptions:
  - hold the bond until maturity
  - full, timely coupon, principal payments (no default)
  - coupons are reinvested at original YTM
- Calculation: iteration, back out

- Annual -coupon bond

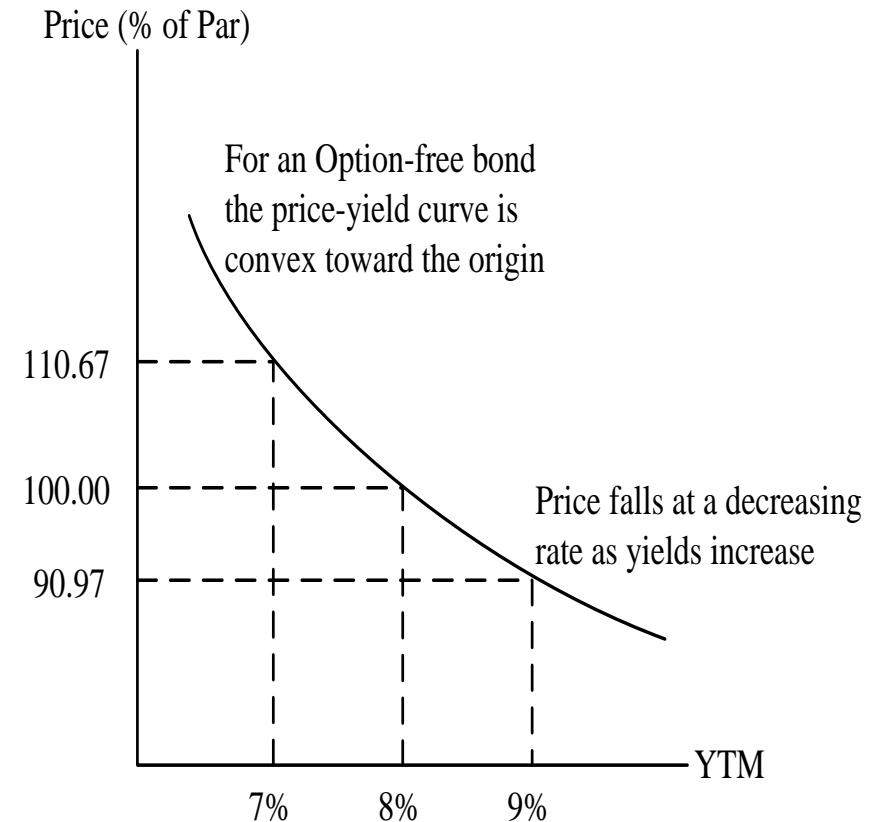
$$\text{bond price} = \frac{CPN_1}{(1 + YTM)} + \frac{CPN_2}{(1 + YTM)^2} + \dots + \frac{CPN_N + \text{Par}}{(1 + YTM)^N}$$

- Semiannual-coupon bond:

$$\text{bond price} = \frac{CPN_1}{\left(1 + \frac{YTM}{2}\right)} + \frac{CPN_2}{\left(1 + \frac{YTM}{2}\right)^2} + \dots + \frac{CPN_{2N} + \text{Par}}{\left(1 + \frac{YTM}{2}\right)^N}$$

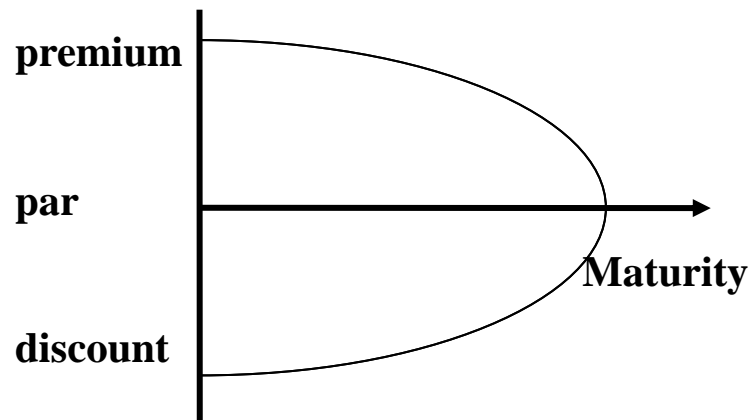
# Relationships Between Price and Time

- A bond's price and YTM are inversely related.
- A bond will be priced at a discount (premium) to par value if coupon rate is less (more) than its YTM.
- For a given change in yield, the percentage price increase is greater than the percentage price decrease.



# Relationships Between Price and Time

2015.06 (1)



- Consider a \$100 par value bond with a 7% coupon paid annually and 5 years to maturity. At a discount rate of 6.5%, the value of the bond today is \$102.08. One day later, the discount rate rises to 7.5%. Assuming the discount rate remains at 7.5% over the remaining life of the bond, what is most likely to occur to the price of the bond between today and maturity?
- A. Increases then decreases
  - B. Decreases then increases
  - C. Decreases then remains unchanged
- **B is correct.**

# Relationships Between Price and Time

2014.06 (1)

- Consider a \$100 par value bond with a 7 percent coupon paid annually and 5 years to maturity. At a discount rate of 6.0 percent, the value of the bond is \$104.21. One year later, the appropriate discount rate has risen to 6.5 percent and the bond's value is \$101.71. What part of this change in value is most likely attributable to the passage of time?
- A. \$0.37  
B. \$0.74  
C. \$1.76

➤ **Solution: B**

With 4 years remaining to maturity and a discount rate that is unchanged at 6.0 percent, the value of the bond would be \$103.47 or

$$N=4, I/Y=6, PMT=7, FV=100, CPT(PV)=103.47$$

$$\text{The value change attributable to the passage of time} = 104.21 - 103.47 = 0.74$$

# Arbitrage-Free Valuation

2014.12 (1)

2014.06 (1)

- Using the U.S. Treasury spot rates provided below, the arbitrage-free value of a 2-year Treasury, \$100 par value bond with a 6% coupon rate is closest to:

Period	Years	Spot Rate
1	0.5	1.60%
2	1.0	2.20%
3	1.5	2.70%
4	2.0	3.10%

A. \$99.75.

B. \$105.65.

C. \$107.03.

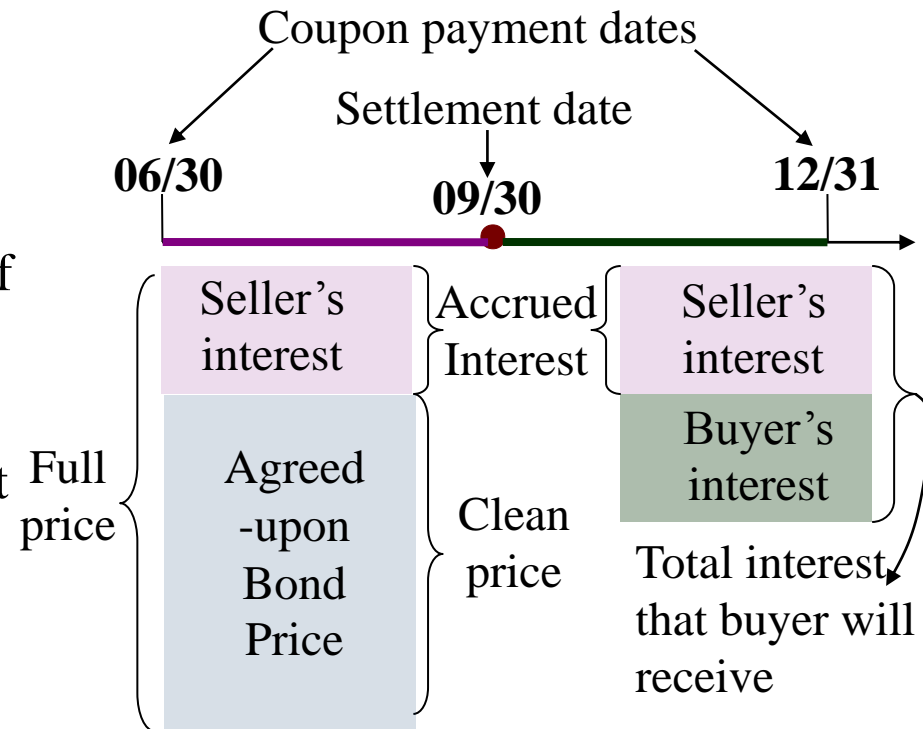
- **B is correct.**

$$\frac{3}{(1 + 0.0160 / 2)^1} + \frac{3}{(1 + 0.0220 / 2)^2} + \frac{3}{(1 + 0.0270 / 2)^3} + \frac{103}{(1 + 0.0310 / 2)^4} = 105.65$$

# Accrued Interest, Full Price, Clean Price

2015.12 (1) 2015.06 (1)

- **Accrued Interest:** the interest received by the seller when a bond trades between coupon dates.
- **Clean(flat) Price:** the agreed upon price of the bond.
- **Full Price (or dirty price):** the amount that the buyer pays to the seller, which equals the clean price plus any accrued interest.



$$\text{Full Price} = \text{Clean Price} + \text{Accrued Interest}$$



# Example

2015.12 (1) 2014.06 (1)

➤ Bond G, described in the exhibit below, is sold for settlement on 16 June 2014. Calculate the **clean price** that Bond G will settle at on 16 June 2014

Annual Coupon	5%
Coupon Payment Frequency	Semiannual
Interest Payment Dates	10 April and 10 October
Maturity Date	10 October 2016
Day Count Convention	30/360
Annual Yield-to-Maturity	4%

➤ Answer:

● The bond's full price is determined in the following manner: As of the beginning of the coupon period on 10 April 2014, there are 2.5 years to maturity. These five semiannual periods occur on 10 October 2014, 10 April 2015, 10 October 2015, 10 April 2016 and 10 October 2016.

$PMT=2.5$ ,  $I/Y=2$ ,  $N=5$ ,  $FV=100$ ,  $CPT PV=102.36$

$$P_{\text{full}} = 102.36 \times (1.02)^{\frac{66}{180}} = 103.10$$

$$\text{Accrued interest} = 2.5 \times \frac{66}{180} = 0.92$$

$$P_{\text{clean}} = 103.10 - 0.92 = 102.18$$

# Matrix Pricing

2014.12 (1) 2014.06 (1)

- **Matrix pricing:** a method of estimating the required YTM of bonds that are currently not traded or infrequently traded bonds according to the yields of traded bonds with the same credit quality.
- **Linear interpolation** can be used when the maturities between the valued bond and the traded bond are different.

## Example:

- An analyst needs to assign a value to an illiquid four-year, 4.5% annual coupon payment corporate bond. The analyst identifies two corporate bonds that have similar credit quality: One is a three-year, 5.5% annual coupon payment bond priced at 107.500 per 100 of par value, and the other is a five-year, 4.5% annual coupon payment bond priced at 104.750 per 100 of par value. Using matrix pricing, the estimated price of the illiquid bond per 100 of par value is closest to:
  - A. 103.895
  - B. 104.991
  - C. 106.125

**B is correct.**

# Yield measures for floating-rate notes

2014.12 (1)

- Coupon rate = reference rate + **quoted margin**
  - **Quoted margin:** margin used to calculate the bond coupon payments
- Discount rate = reference rate + **required margin (or discount margin)**
  - **Required/discount margin:** margin required to return the FRN to its par value at each reset date.
    - ✓ Selling at par(credit unchanged): required margin = quoted margin
    - ✓ Selling at discount(downgrade of credit): quoted margin < required margin
    - ✓ Selling at premium(upgrade of credit): quoted margin > required margin
- A two-year floating-rate note pays 6-month Libor plus 80 basis points. The floater is priced at 97 per 100 of par value. Current 6-month Libor is 1.00%. Assume a 30/360 day-count convention and evenly spaced periods. The discount margin for the floater in basis points (bps) is closest to:
  - A. 180 bps.
  - B. 236 bps.
  - C. 420 bps.
- **Correct answer: B**

# Introduction to Fixed-Income Valuation

## ➤ Yield measures for money market instruments

- Discount yield: (e.g., U.S. Treasury bills)  $PV = FV \times \left(1 - \frac{Days}{Year} \times DR\right)$  2015.06 (1)
- Add-on yield: (e.g., LIBOR, bank CD rates)  $PV = \frac{FV}{\left(1 + \frac{Days}{Year} \times AOR\right)}$  2014.06 (1)
- Both discount basis and add-on yields in the money market are quoted as simple annual interest and can be based on a 360-day or 365-day basis.
- **Bond equivalent yield** (investment yield) for money market security: yield stated on a 365-day add-on rate basis.

## ➤ **Current yield(income or interest yield):** not consider capital gains/loss or reinvestment income $current\ yield = \frac{annual\ coupon}{price}$

## ➤ **Yield to call (put)** is calculated as a YTM but with the number of periods until the call (put) price substituted for the number of periods to maturity and the maturity value.

2014.12 (1)

# Yield Curve

2014.12 (1)

- **Yield curve** shows the term structure of interest rates by displaying yields across different maturities.
- **Spot curve**: a yield curve for single payments in the future, such as zero-coupon bonds or stripped Treasury bonds.
  - Spot curve for U.S. Treasury bonds is called the zero-curve or strip curve.
- **Yield curve for coupon bonds** shows the YTM for coupon bonds at various maturities, which can be calculated by linear interpolation
- **Par bond yield curve**: shows the coupon rates for bonds of various maturities that would result in bond prices equal to their par values.

## Example:

- Consider a 3-year annual-pay bond with spot rates of 1%, 2%, 3%, the coupon payment satisfies:

$$\frac{\text{PMT}}{1.01} + \frac{\text{PMT}}{(1.02)^2} + \frac{\text{PMT}+100}{(1.03)^3} = 100$$

**Solution:** PMT=2.96, par bond coupon rate=2.96%

- **Forward yield curve** shows the future rates for bonds or money market securities for the same maturities for annual periods in the future.

# Forward Rates vs. Spot Rates

2015.12 (1) 2015.06 (1)

➤ **Forward Rates:** borrowing/lending rate for a loan to be made at some future date. Marginal return for extending the time-to-maturity for an additional period

- E.g. The int. of a 1-year loan that would be made 2 years from now
- Notation: 2y1y rate of a 1-year loan to be made 2 years from now

➤ **Relationship Between Forward Rates and Spot Rates**

$$(1 + S_T)^T = (1 + S_1)(1 + 1y1y) \dots (1 + (T - 1)y1y)$$

➤ **Valuation Using Forward Rates**

$$\text{bond value} = \frac{CF_1}{(1 + S_1)} + \frac{CF_2}{(1 + S_1)(1 + 1y1y)} + \dots + \frac{CF_n}{(1 + S_1)(1 + 1y1y) \dots (1 + (T - 1)y1y)}$$

# Yield Spread

2015.06 (1)

2014.06 (1)

- Benchmark spread: a yield spread relative to a benchmark bond.
  - G-spread: the benchmark is government bond yield
  - Interpolated spread (I-spread): the benchmark is swap rate
  - Zero-volatility spread (Z-spread): the spread that must be added to each rate on the benchmark yield curve to make the present value of a bond equal to its price.
- The difference between the GS and the ZS
  - The steeper the benchmark spot rate curve, the greater the difference between the two spread measures.
  - The earlier bond principal is paid, the greater the difference between the two spread measures
- Option-adjusted spread (OAS): used for bonds with embedded options.
  - Callable bond:  $ZS > OAS$
  - Puttable bond:  $ZS < OAS$

# Example

2014.06 (1)

Bond	Coupon rate	Time-to-maturity	Price
U.K. Government Benchmark Bond	2%	3 years	100.25
U.K. Corporate Bond	5%	3 years	100.65

- Both bonds pay interest annually. The current three-year EUR interest rate swap benchmark is 2.12%. The G-spread in basis points (bps) on the U.K. corporate bond is closest to:
- A. 264 bps.
  - B. 285 bps.
  - C. 300 bps .
- Answer: B



# Framework of Fixed Income

## ➤ Study Session 15 — Basic Concepts

- R52 Fixed-Income Securities: Defining Elements
- R53 Fixed-Income Markets: Issuance, Trading, and Funding
- R54 Introduction to Fixed-Income Valuation
- R55 Introduction to Asset-Backed Securities

## ➤ Study Session 16 — Analysis of Risk

- R56 Understanding Fixed-Income Risk and Return
- R57 Fundamentals of Credit Analysis

# Framework

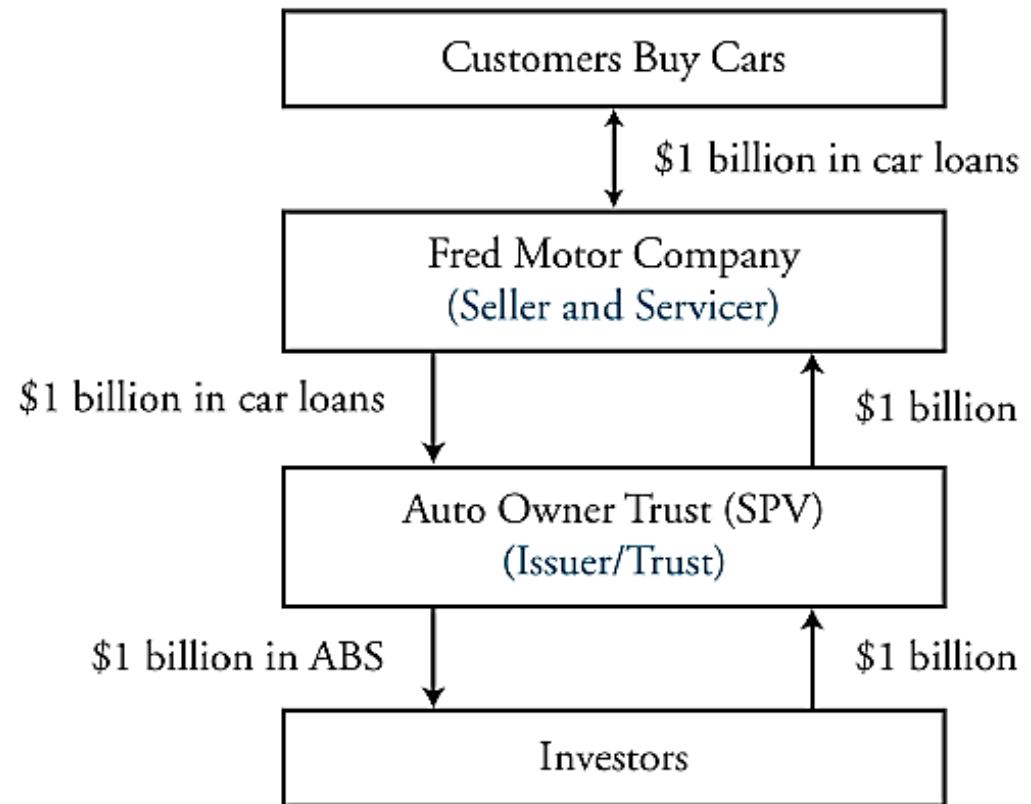
- Securitization
- Mortgage-Backed Securities (MBS)
  - Residential Mortgage Loans
  - Residential Mortgage-Backed Securities (RMBS)
    - ✓ Agency MBS
      - ◆ Mortgage passthrough security (MPS)
        - ▣ Weighted average maturity (WAM)
        - ▣ Weighted average coupon (WAC)
      - ◆ Prepayment risk
      - ◆ Structure of CMO
        - ▣ Sequential pay CMO
        - ▣ PAC & support tranche
        - ▣ Floating-rate tranche
    - ✓ Non-agency MBS
      - Commercial Mortgage-Backed Securities (CMBS)
- Non-Mortgage Asset-Backed Securities (ABS)
- Collateralized Debt Obligations (CDO)

# Parties Involved in the Process of Securitization

2015.06 (1)

➤ Parties involved in the process of securitization and their functions:

- The seller (Fred) originates the auto loans and sells the portfolio of loans to Auto Loan Trust, the SPE.
- The issuer/trust (Auto Loan Trust) is the SPE that buys the loans from the seller and issues ABS to investors.
- The servicer (Fred) services the loans.
- In this case, the seller and the servicer are the same entity (Fred Motor Company), but that is not always the case.



# Residential Mortgage Loans

- Rights of the lender in a foreclosure
  - **Recourse loan:** the lender has a claim against the borrower for the shortfall between the amount of the mortgage balance outstanding and the proceeds received from the sale of the property.
    - ✓ Residual mortgage in most European countries are recourse loan
  - **Nonrecourse loan:** the lender does not have such a claim, so the lender can look only to the property to recover the outstanding mortgage balance.
    - ✓ In the United States, residential mortgages are typically non-recourse loans.
- **Strategic default:** the borrower has an incentive to default and allow the lender to foreclose on the property if the value of the property declines below the amount owed by the borrower, even if resources are available to continue to make mortgage payments

# Residential Mortgage-Backed Securities

## Government National Mortgage Association (Ginnie Mae)

- Federal-related institution, its guarantees carries the full faith and credit of the U.S. government

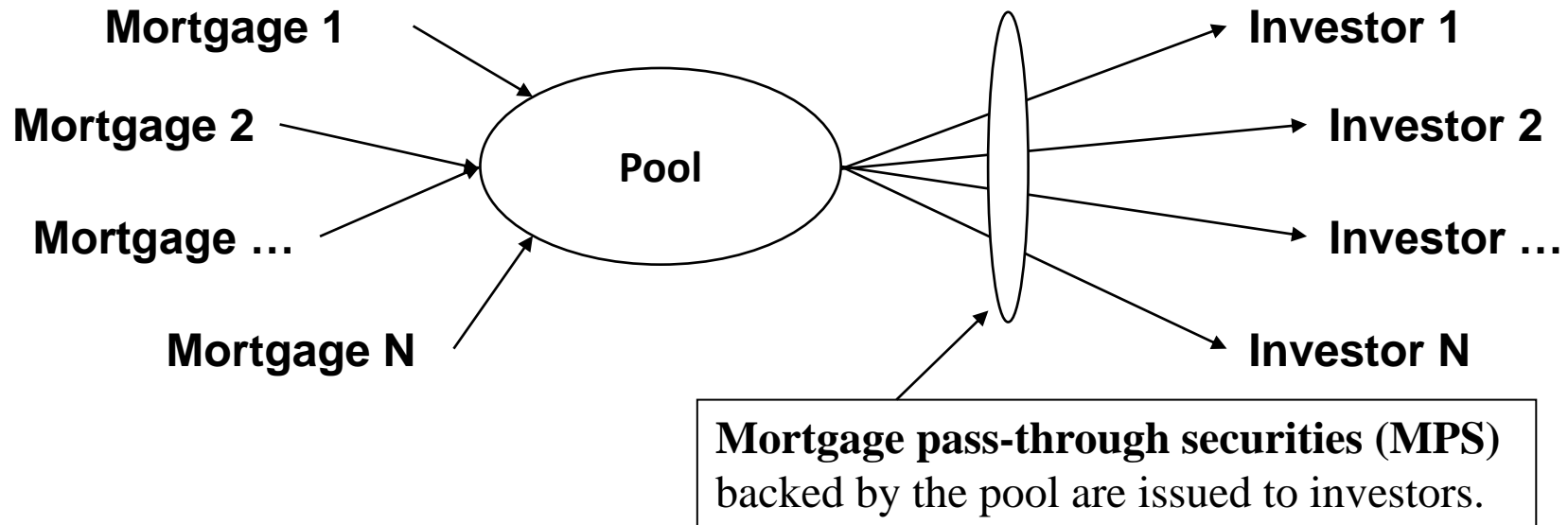
## Federal Home Loan Mortgage Corporation (Freddie Mac)

- Freddie Mac and Fannie Mae are government sponsored enterprises. Their guarantee does not carry the full faith and credit of the government.
- The pass-through securities issued by Fannie and Freddie are called conventional pass-through securities

## Federal National Mortgage Association (Fannie Mae)

- If a loan satisfies the underwriting standards for inclusions as collateral for an agency MBS, it is called a *conforming mortgage*.
- *Nonconforming mortgage pass-through securities* are issued by thrifts, commercial banks, and private conduits

# Residential Mortgage-Backed Securities



## ➤ Pass-through rate

- Pass-through rate is less than the mortgage rate on the underlying pool of mortgages by servicing and guaranteeing fees
- **Mortgage rate – Pass-through rate = Servicing fees**

# Residential Mortgage-Backed Securities

## ➤ Type of prepayment risk

- **Contraction risk** occurs as interest rates fall, prepayment rates increase, the security will have a shorter maturity than was anticipated at the time of purchase because of refinancing at now-available lower rate.
  - ✓ The proceeds received must now be invested at lower interest rates
  - ✓ Price appreciation is not as great as that of an otherwise identical bond that does not have a prepayment or call option
  - ✓ **Contraction risk** occurs as mortgage rates fall, prepayment rates increase, and the average life of the pass-through security decreases.

# Residential Mortgage-Backed Securities

- **Extension risk** occurs as interest rates rise, prepayment rates slow, and the security becomes longer in maturity than anticipated at the time of purchase because investors are reluctant to give up the benefits of a contractual interest rate that now looks low.
  - ✓ The value of the security has fallen because interest rates are higher
  - ✓ Income they receive can potentially reinvest is typically limited to the interest payment and scheduled principal repayments
  - ✓ Extension risk occurs as mortgage rates rise, prepayment rates slow, and the average life of the pass-through security increase.



# Residential Mortgage-Backed Securities

## ➤ *Prepayment rates*

- Two industry conventions have been adopted as benchmarks for prepayment rates: the **conditional prepayment rate (CPR)** and the **Public Securities Association (PSA)** prepayment benchmark.
  - ✓ CPR is **the annual rate** at which a mortgage pool balance is assumed to be prepaid during the life of the pool.

### **The PSA standard benchmark:100%PSA**

- CPR=0.2% for the first month after origination, increasing by 0.2% per month up to 30 months. For example, the CPR in month 14 is 2.8%.
- CPR=6% for months 30 to 360
- After 30 months, no prepayment rate is added.

## ➤ **Monthly prepayment rate**: single monthly mortality rate (SMM)

$$\text{SMM} = \frac{\text{Prepayment for month}}{(\text{Beginning mortgage balance for month} - \text{scheduled principal repayment for month})}$$

$$\text{SMM} = 1 - (1 - \text{CPR})^{1/12}$$

# Collateralized Mortgage Obligations (CMO)

## ➤ *Creating collateralized mortgage obligations (CMOs)*

- CMOs are securities issued against pass-through securities for which the cash flows have been reallocated to different tranches.
- Each CMO tranche represents a different mixture of contraction and extension risk.
- Redistribution of the original passthrough securities' cash flows does not eliminate contraction and extension risk.

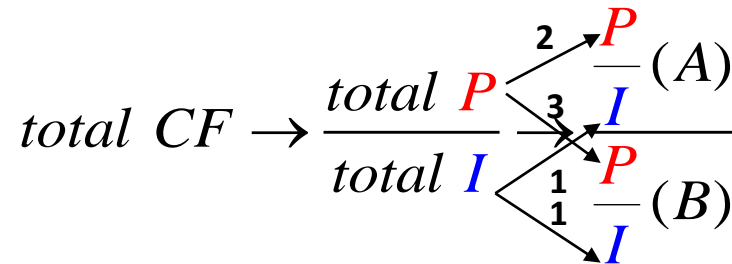
# Collateralized Mortgage Obligations (CMO)

2015.06 (1)

## ➤ Different types of CMOs

### ➤ 1. Sequential Pay tranches

- Each class of bonds is retired sequentially in sequential pay CMO.



- Contraction and extension risk still exist with this structure, but they have been redistributed to some extent between the two tranches.
- The short tranche, which matures first, offers relatively more protection against extension risk. The other tranche provides more protection against contraction risk.

# Collateralized Mortgage Obligations (CMO)

2015.12 (1)

2015.06 (1)

## ➤ 2. PAC and support

- A PAC is a tranche that is amortized based on a sinking fund schedule that is established within a range of prepayment speeds called the initial PAC collar.
- There is a principal repayment schedule that must be satisfied.
- PAC bondholders have priority over all other classes in the CMO structure in receiving principal payments from the collateral.
- The greater certainty of the cash flow for the PAC bonds comes at the expense of the non-PAC tranches (support tranches). It is these tranches that absorb the prepayment risk.
- PAC tranches have protection against both extension risk and contraction risk, providing two-sided prepayment protection.
- When the support tranches will eventually be paid off, and the principal will then go to the PAC holders, and the PAC is referred to as a broken or busted PAC.

# Collateralized Mortgage Obligations (CMO)

Average Life Variability of PAC I Tranche vs. Support Tranche

<i>PSA Speed</i>	<i>PAC I Tranche</i>		<i>Support Tranche</i>
0	13.2		24.0
50	8.8		21.2
100	6.5	↑	17.1
150	6.5		13.3
200	6.5	Initial Collar	10.4
250	6.5		5.2
300	6.5	↓	2.9
350	5.9		2.4
400	5.4		1.8
450	4.6		1.5
500	4.2		1.2

# Non-agency RMBS

- Non-agency RMBS: RMBS issued by entities other than Ginnie Mae, Fannie Mae, and Freddie Mae
- Differences between Agency and Non-agency securities
  - Agency securities: CMOs are created from pools of passthrough securities.
  - Non-agency securities: CMOs are created from unsecuritized mortgage loans.
  - Non-agency securities have no explicit or implicit government guarantee of payment of interest and principal as agency securities have.
  - All non-agency securities are credit enhanced: external and internal.

# Commercial mortgage-backed securities (CMBS)

2015.06 (1)

- CMBS are **no recourse loans**; the lender can only look to the collateral (income-producing property) as means to repay a delinquent loan
- **Call protection**
  - **Loan-level call protection**
    - ✓ **Prepayment lock out.** For a specific period of time (typically two to five years), the borrower is prohibited from prepaying the mortgage loan.
    - ✓ **Defeasance.** Should the borrower insist on making payments on the mortgage loan, the mortgage loan can be defeased, which means the loan proceeds are received by the loan servicer and invested in U.S. Treasury securities, essentially creating cash collateral against the loan.
    - ✓ **Prepayment penalty points.** A penalty fee may be charged if the borrower prepays the mortgage loan.
      - ◆ In many cases, this penalty fee is quoted as a 5-4-3-2-1, which means the penalty fee is 5% of the principal amount of the loan in the first year, and 1% of the principal amount if repaid in the fifth year of the mortgage.
    - ✓ **Yield maintenance charges.** The borrower is charged the amount of interest lost by the lender should the loan be prepaid.
  - **CMBS-level call protection**
    - ✓ CMBS loan pools are segregated into tranches with a specific sequence of repayment.
    - ✓ Those tranches with a higher priority for prepayment or collateral position will have a higher credit rating than lower priority tranches.

# Commercial mortgage-backed securities (CMBS)

## ➤ Balloon maturity provisions

- Balloon loans require substantial principal payment at the end of the term of the loan
- If the borrower fails to make the balloon payment, the borrower is in default. (**balloon risk**)
- Balloon risk is a type of **extension risk**.



# Non-Mortgage Asset-backed Securities (ABS)

## Non-Mortgage Asset-backed Securities (ABS)

### ➤ 1. Auto Loan ABS

- Auto loan market is tiered based on the credit quality of the borrowers.
  - ✓ Short-term nature
  - ✓ Major issuers of auto loans have tended to follow prudent underwriting standards
- Auto loans prepay if the cars sold, traded in, repossessed, stolen, wrecked, or the loan is paid off from insurance proceeds, the borrower may simply use excess cash to prepay
- Refinancing is not a major factor contributing to prepayment
  - ✓ Loan balances are small, the automobile's value may depreciate faster in early years
  - ✓ Prepayment is more predictable and less dependent on interest rate change

# Non-Mortgage Asset-backed Securities

2015.12 (1)

- **2. Credit Card Receivable-backed securities:** credit card receivables are used as collateral for the issuance, **non-amortizing loans**.
  - For a pool of credit receivables, the cash flows consist of:
    - ✓ **Finance charges collected:** represent the periodic interest the credit card borrower is charged on the unpaid balance after the grace period.
    - ✓ **Fees:** include late payment fees and any annual membership fees.
    - ✓ **Principal repayments:** “early amortization” or “rapid amortization” provisions included to safeguard the credit quality of the issue.
  - **Lockout periods:** cash flow paid out based only on finance charges collected and fees.
    - ✓ **After lockout periods:** principal no longer reinvested but paid to investors.

# Collateralized debt obligation (CDO)

2015.06 (1)

## ➤ Collateralized debt obligation (CDO)

- A collateralized debt obligation (CDO) is a security backed by a diversified pool of one or more of the following types of debt obligations:

U.S. domestic high-yield corporate bonds	Collateralized bond obligation (CBO)
Structured financial products	
Emerging market bonds	
Bank loans	Collateralized loan obligation (CLO)
Special situation loans and distressed debt	

### ● A structure of a CDO

Senior tranche	At least A
Mezzanine tranche	BBB but no less than B
Subordinate/equity tranche	Receive the residual cash flow

- ✓ In typical structure, one or more of the tranches is a **floating-rate security**.
- ✓ Asset manager uses **interest rate swap** to deal with the mismatch.

# Framework of Fixed Income

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# Framework

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- Annualized holding period return
- Interest rate risk
  - Duration
  - Convexity
  - Duration gap

# Source of Return

2015.12 (1)

➤ Three sources of return:

- Coupon and principal payments
- Reinvestment of coupon payments
- Capital gain or loss if bond is sold before maturity

➤ Total return: future value of reinvested coupon interest payments and the sale price (par value if the bond is held to maturity)

➤ Annualized holding period return: calculated as the compound annual return earned from the holding period .

$$\text{annualized holding period return} = \left( \frac{\text{total return}}{\text{bond price}} \right)^{1/n} - 1$$

# Interest Rate Risk

## ➤ Interest risk

- 利率风险：即债券价格对利率变化的敏感程度，价格对利率变化越敏感，价格波动的可能性就越高
- 通常用久期duration来衡量利率风险，久期越高，利率风险越高

$$\text{duration} = - \frac{\text{percentage change in bond price}}{\text{yield change in percent}}$$

$$\text{Percentage price change} = - \text{duration} \times \text{yield change in \%}$$

# Duration

➤ **Duration:** a measure of a bond's interest rate risk or sensitivity of a bond's full price to a change in its yields.

- Yield duration: sensitivity of the bond price with respect to the bond's own yield-to-maturity (Macaulay duration, modified duration, money duration, PVBP)

✓ **Macaulay duration**

$$\text{Macaulay duration} = \frac{\sum_{t=1}^n t \times PVCF_t}{\sum_{t=1}^n PVCF_t (= P_0)} = \sum_{t=1}^n [t \times (PVCF_t / P_0)]$$

✓ **Modified duration**

$$\text{Modified duration} = \frac{\text{Macaulay duration}}{1 + \text{periodic market yield}} \quad 2015.12 (1)$$

✓ **Approximate modified duration**

$$\text{Approximate modified duration} = \frac{V_- - V_+}{2 \times V_0 \times \Delta YTM}$$

$$\Delta P / P \approx -\text{ModDur} \times \Delta YTM$$

- Curve duration: sensitivity of the bond price (or more generally, the market value of a financial asset or liability) with respect to a benchmark yield curve effective duration.(used for bonds with embedded option)

$$\text{Effective duration} = \frac{V_- - V_+}{2 \times V_0 \times \Delta \text{curve}} \quad \begin{array}{ll} 2015.12 (2) & 2015.06 (1) \\ 2014.12 (1) & 2014.06 (1) \end{array}$$



# Money Duration and PVBP

## ➤ Money duration/dollar duration

2014.06 (2)

Money duration=annual modified duration \* full price of bond

## ➤ Money duration expressed as money duration per 100 of bond par value

Money duration per 100 units of par value

=annual modified duration \* full price of bond per 100 of par value

## ➤ Price value of a basis point (PVBP): is the money change in full price of a bond when its YTM changes by one basis point(0.01%)

2015.12 (1)

2014.06 (1)

$$PVBP = D \times 1bp \times P$$

$$PVBP = \frac{(V_- + V_+)}{2}$$

# Definition of Duration

2015.06 (1)

2014.12 (1)

## ➤ Interpreting duration:

- Duration is the **slope** of the price-yield curve at the bond's current YTM.  
(the first derivative of the price-yield curve with respect to yield, but it's not absolutely right for such description)
- Duration is a weighted average of time (in years) until cash flow will be received. The weights are the proportions of the total bond value that each cash flow represents.
- Duration is the approximate percentage change in price of 1% change in yield. (price sensitivity)

# Effects of Bond Characteristics on Duration

2015.06 (1)

2014.12 (1) 2014.06 (1)

## ➤ Effects of bond characteristics on duration:

- Longer maturity, higher duration.
- Lower coupon, higher duration.
- Lower market yield, higher duration
- Bond with embedded options (callable bond & puttable bond) has lower duration.

## ➤ 注:

- $D_{\text{perpetuity}} = (1 + YTM) / YTM$
- $D_{\text{zero-coupon bond}} = M_{\text{zero-coupon bond}}$
- $D_{\text{discount}} > D_{\text{premium}}$
- $D_{\text{discount}}$  随着时间的变化先增加后减小，并不是时间越长，duration越大。

# Portfolio duration

## ➤ Portfolio duration

2015.12 (1)

2014.12 (1)

$$\text{Portfolio duration} = w_1 D_1 + w_2 D_2 + \dots + w_n D_n$$

- **Limitations:** the measure of portfolio duration implicitly assumes a parallel shift in the yield curve.

2015.06 (1)

2014.06 (1)

- ✓ A parallel yield curve shift implies that all rates change by the same amount in the same direction.
- ✓ In reality, interest rate changes frequently result in a steeper or flatter yield curve. (**non-parallel shifts** → **key rate duration**)

2015.12 (1)

# Convexity

- **Convexity** is a measure of the curvature of the price-yield curve.

$$\text{approximate convexity} = \frac{V_- + V_+ - 2V_0}{(\Delta \text{ YTM})^2 V_0}$$

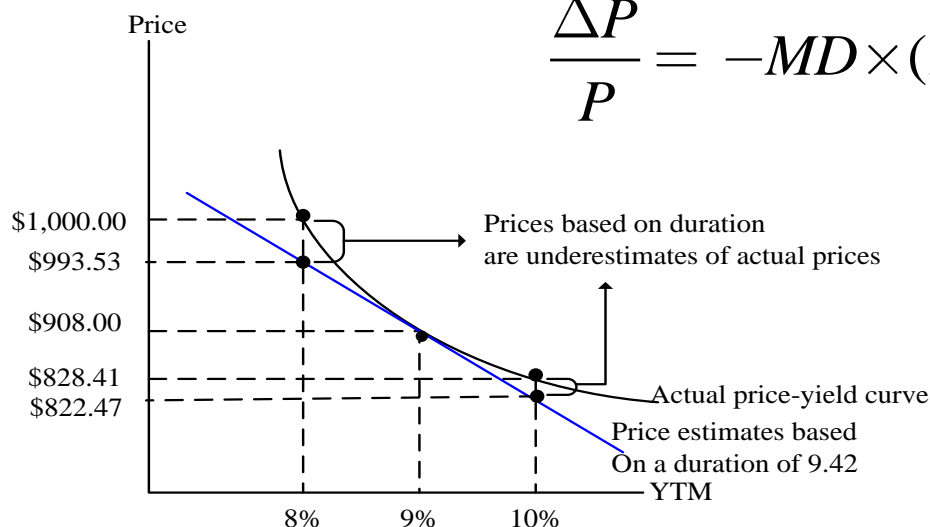
2015.12 (1)  
2015.06 (1)

- **Effective Convexity:**

$$\text{effective convexity} = \frac{V_- + V_+ - 2V_0}{(\Delta \text{ curve})^2 V_0}$$

- The convexity adjustment is always positive when convexity is positive

$$\frac{\Delta P}{P} = -MD \times (\Delta y) + \left[ 0.5 \times Conv \times (\Delta y)^2 \right]$$



2015.12 (2) 2015.06 (2)  
2014.12 (2) 2014.06 (2)

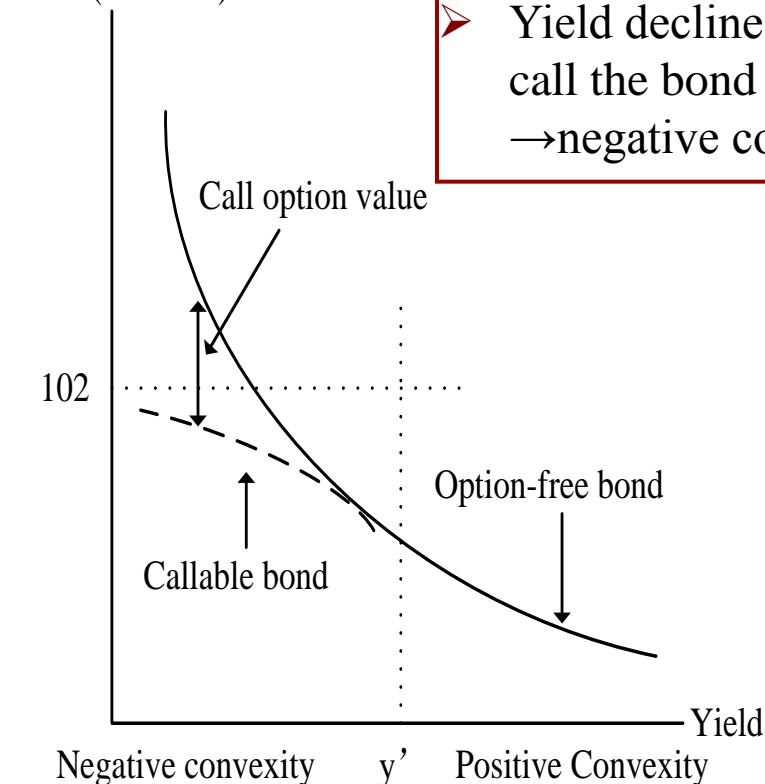
2015.06 (2)  
2014.06 (1)

# Convexity

2015.12 (2)

## Callable

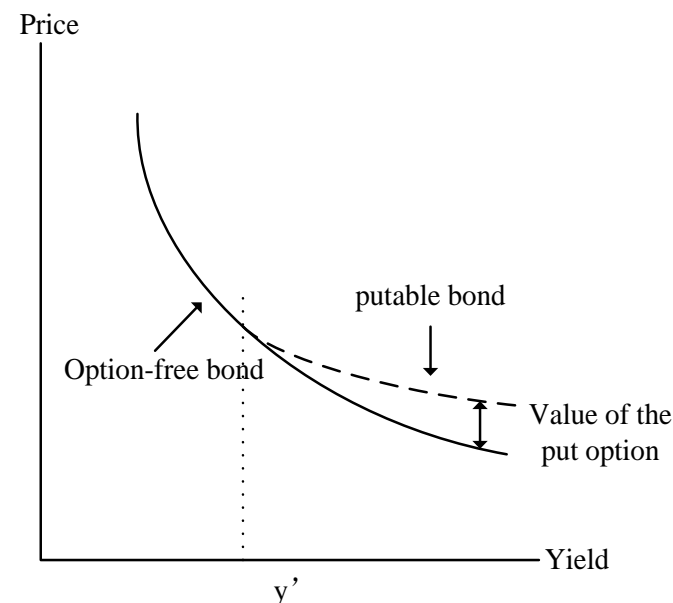
Price (% of Par)



- High yield → unlikely call, → positive convexity
- Yield decline → may call the bond → negative convexity

## Putable

- price/yield relationship will be more convex when yield increase



# Duration gap

2015.06 (1)

2014.12 (1) 2014.06 (3)

- Macaulay duration may be interpreted as the investment horizon for which a coupon reinvestment risk and market price risk just offset each other, assuming there's a one-time parallel shift in the yield curve that occurs before the next coupon payment date.
- Relationships among interest rate risk, Macaulay duration, and investment horizon:
  1. if investment horizon  $>$  Macaulay duration, then reinvestment risk dominates price risk, investor's risk is to lower interest rates.
  2. if investment horizon = Macaulay duration, then reinvestment risk offsets price risk
  3. if investment horizon  $<$  Macaulay duration, then price risk dominates reinvestment risk, investor's risk is to higher interest rates.
- **Duration gap:**

$$\text{Duration gap} = \text{Macaulay duration} - \text{investment horizon}$$

- **Positive gap** exposes the investor to market price risk from increasing interest rates
- **Negative gap** exposes the investor to reinvestment risk from decreasing interest rates

# Framework of Fixed Income

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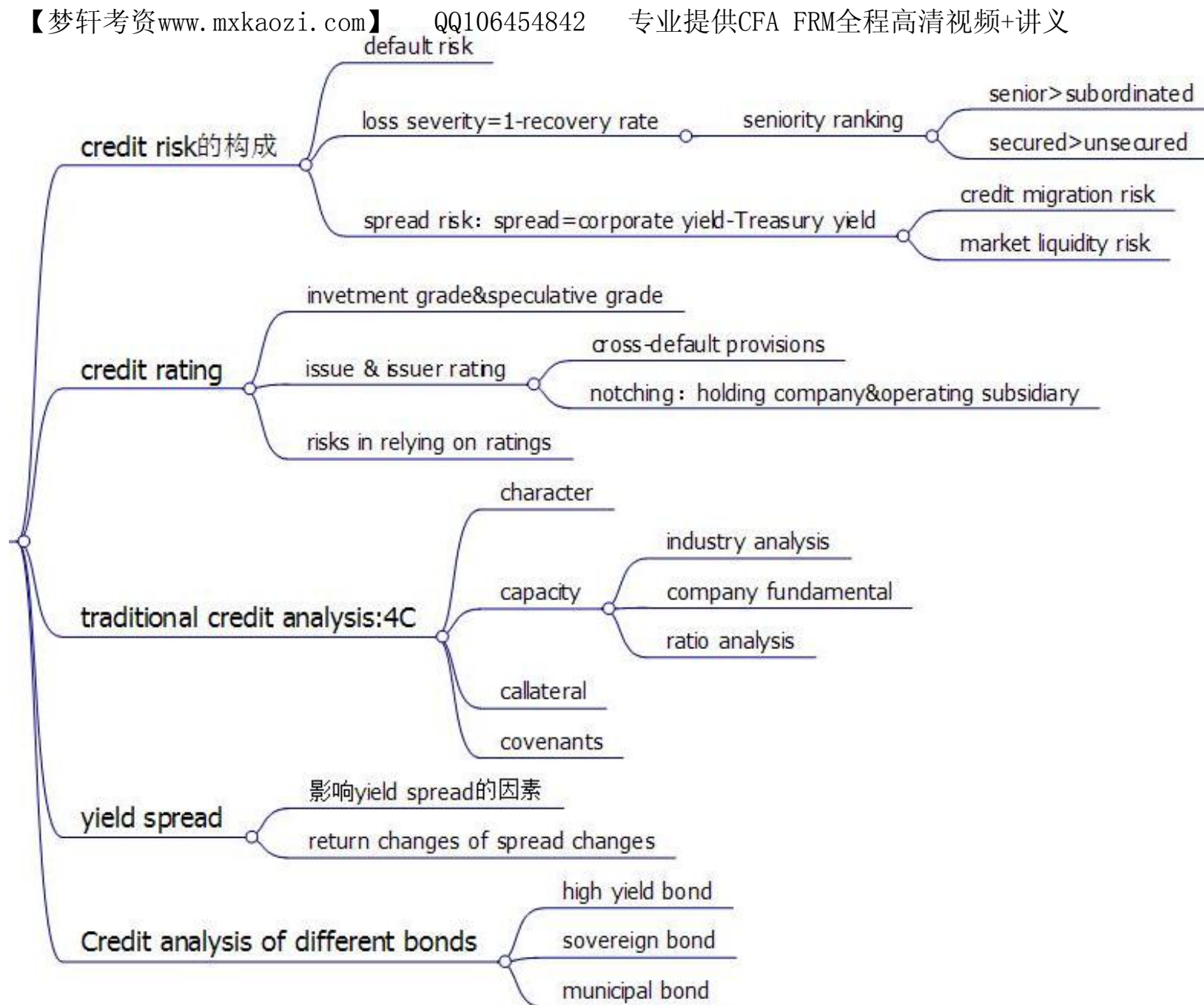
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# R56



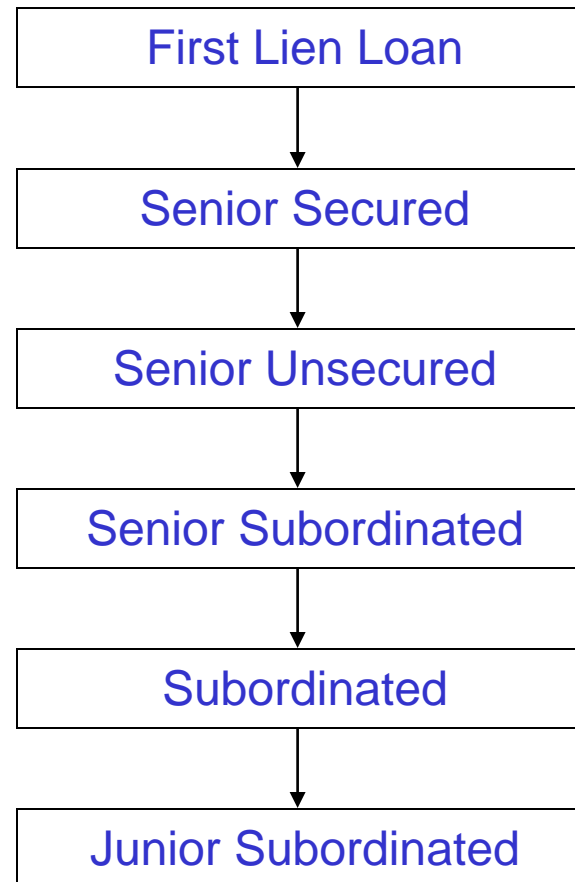
# Fundamentals of Credit Analysis

- **Credit risk** is the risk of loss resulting from the borrower (issuer of debt) failing to make full and timely payments of interest and/or principal. It has two components.
  - **Default risk**, or default probability, is the probability that a borrower defaults – that is, fails to meet its obligation to make full and timely payments of principal and interest, according to the terms of the debt security.
  - **Loss given default**, or loss severity, in the event of default, is the portion of a bond's value (including unpaid interest) an investor loses.
- Expected loss = Default probability \* Loss severity given default
  - Loss severity given default =  $1 - \text{Recovery rate}$
  - **Recovery rate** is the percentage of the principal amount recovered in the event of default.

# Fundamentals of Credit Analysis

2014.12 (2)

- **Capital Structure:** the composition and distribution across operating units of a company's debt and equity, including bank debt, bonds of all seniority rankings, preferred stock, and common equity.
- **Seniority Ranking**



# Fundamentals of Credit Analysis

## ➤ *Credit rating*

- Investment grade
  - ✓ Baa3 or above by Moody's Investors Service
  - ✓ BBB- or above by Standard & Poor's (S&P) and Fitch Ratings
- Non-investment grade/high yield
  - ✓ Below investment grade

➤ ***Issuer credit rating***: address an obligor's overall creditworthiness – its ability and willingness to make timely payments of interest and principal on its debt.

2014.06 (1)

➤ ***Issue ratings*** refer to specific financial obligations of an issuer and take into consideration such factors as ranking in the capital structure (e.g., secured or subordinated).

➤ ***Notching*** is the practice by rating agencies of assigning different ratings to bonds of the same issuer. 2014.12 (1)

➤ ***Cross default provision***: reduce credit risk.

➤ ***Structural subordination***

- Subsidiary's debt covenant may restrict the transfer of cash or assets upstream to the parent company before the subsidiary's debt is serviced. Thus the parent company's bonds are effectively subordinated to the subsidiary's bonds.

# Fundamentals of Credit Analysis

2014.06 (1)

## ➤ Risks in relying on agency ratings:

- **Credit ratings can be very dynamic.**
  - ✓ Creditworthiness can and does change – up or down – and that bond investors should not assume an issuer's credit rating will remain the same from time of purchase through the entire holding period.
- **Rating agencies are not infallible.**
- **Other types of so-called idiosyncratic or event risk are difficult to capture in ratings.**
- **Ratings tend to lag market pricing of credit.**
  - ✓ Bond prices and credit spreads frequently move more quickly because of changes in perceived creditworthiness than rating agencies change their ratings (or even outlooks) up or down.
  - ✓ For certain speculative-grade credits, two bonds with similar ratings may trade at very different valuations.

# Fundamentals of Credit Analysis

## ➤ The four Cs of credit analysis

- *Capacity* refers to the ability of the borrower to make its debt payments on time.
- *Collateral* refers to the quality and value of the assets supporting the issuer's indebtedness.
- *Covenants* are the terms and conditions of lending agreements that the issuer must comply with.
- *Character* refers to the quality of management.

# Fundamentals of Credit Analysis

2015.12 (1)

2014.12 (1)

## ➤ Factors affect the spreads on corporate bonds:

- **Credit cycle**

- ✓ The bond market perceives low aggregate credit risk and is generally bullish. Spreads narrow as the credit cycle improves

- **Economic conditions**

- ✓ Credit spreads narrow as the economy strengthens

- **Financial market performance**

- ✓ Credit spreads narrow in strong-performing markets overall, including the equity market.

- **Broker-dealer capital**

- ✓ Yield spreads are narrower when broker-dealers provide sufficient capital but can widen when market-making capital becomes scarce.

- **General market demand and supply**

- ✓ Credit spreads narrow in times of high demand for bonds.

# It's not an end but just the beginning.

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If there is anyone out there who still questions that China is a place where everything is possible, who wonders if the dream of our founders is alive in our time, who doubts what we can achieve, today is the answer.

It's an answer told by the days and the nights in which we shared our views.

Good luck to everybody!