# FIXED INCOME ANALYSIS

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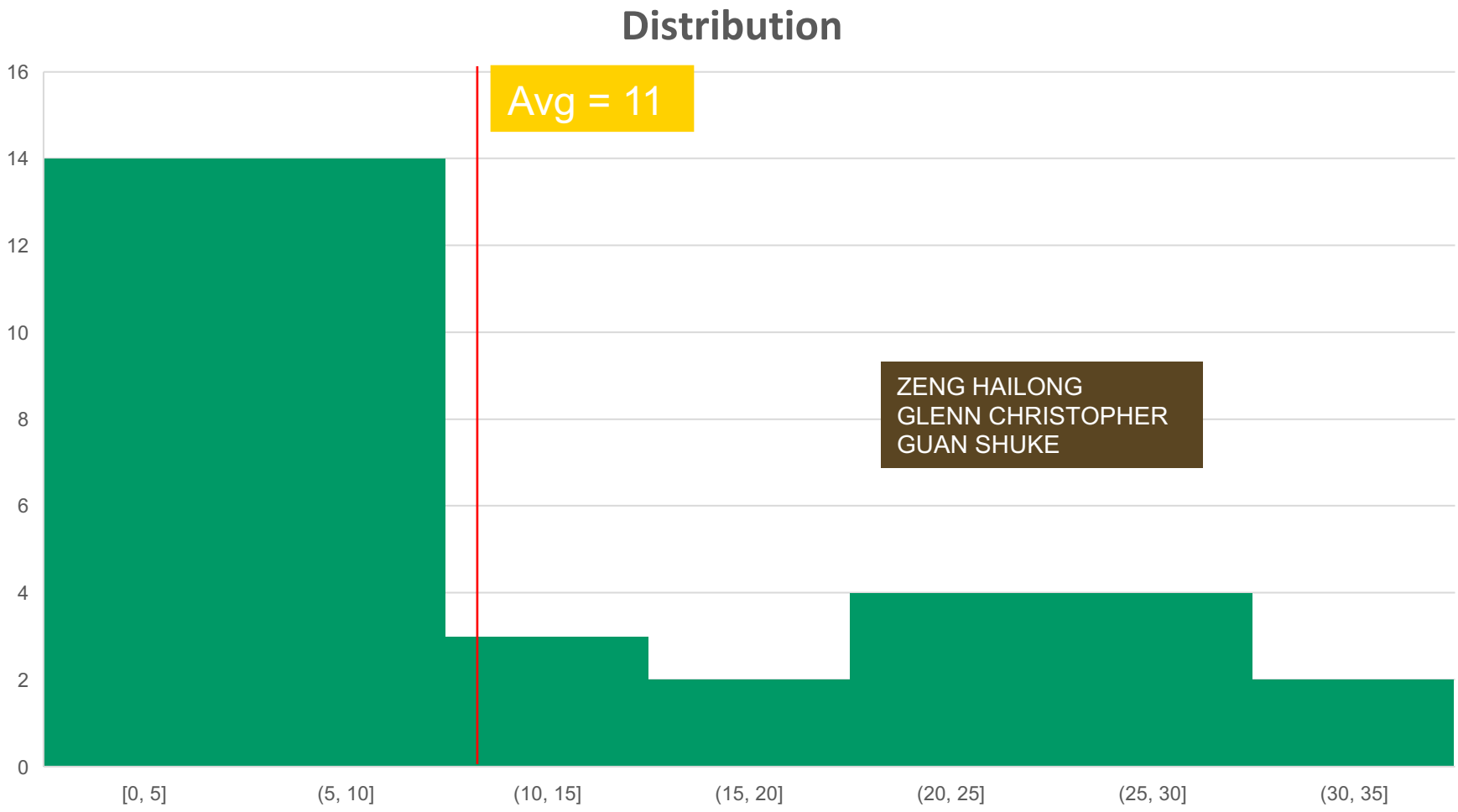
CFA Institute

# WRITE A NUMBER GAME



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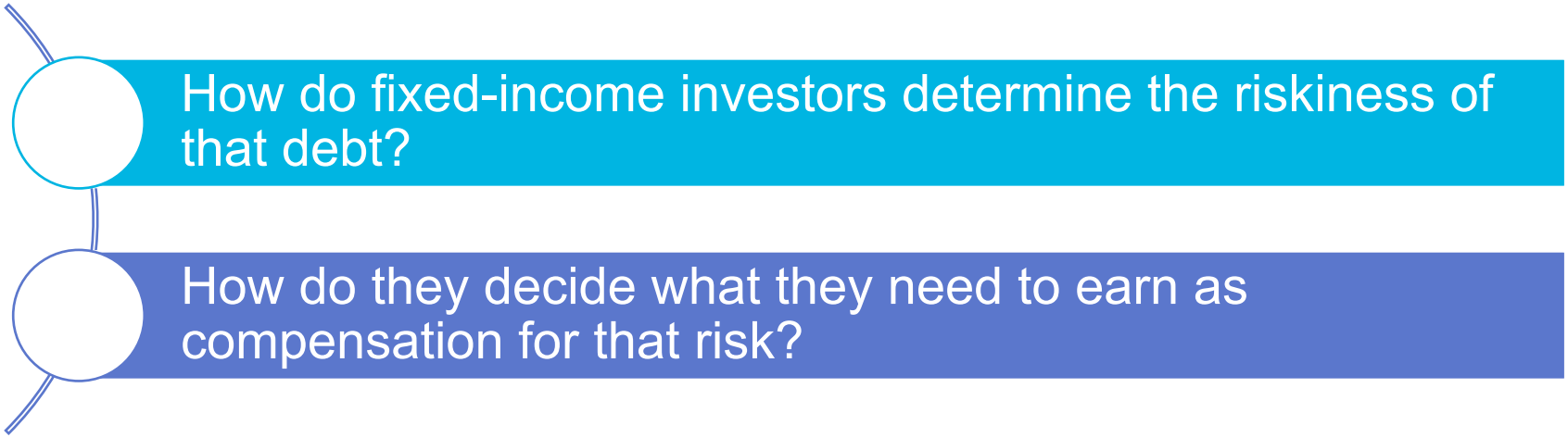
# 1. INTRODUCTION

- Credit analysis has a crucial function in the debt capital markets—efficiently allocating capital by properly assessing credit risk, pricing it accordingly, and repricing it as risks change.
- Credit analysis helps to answer the following questions:



# 2. CREDIT RISK

## Credit Risk

It is the risk of loss resulting from the borrower (issuer of debt) failing to make full and timely payments of interest and/or principal.

## Credit Risk Components:

| Default Risk | Loss Severity |
| --- | --- |
| • 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 | • in the event of default, the portion of a bond's value (including unpaid interest) an investor loses |

# EXPECTED LOSS

A convenient measure of credit risk is expected loss.

$$\text{Expected loss, or } E(\text{loss}) = \text{Default probability} \times \text{Loss severity given default (LGD)}$$

$$\text{LGD} = 1 - \text{Recovery } rate$$

**Example**. Assume the probability of default on the bond is 10% and the average recovery rate, if defaulted, is 40%. Calculate the expected loss:

$$E(\text{loss}) = 0.1 \times (1 - 0.4) = \mathbf{0.06}, \text{ or } \mathbf{6}\%.$$

# IMPORTANT CREDIT-RELATED RISKS

Important credit-related risks include the following:

**Spread risk**: The risk of changing (widening) the credit spread on the bond over a certain benchmark. As a result, the spread may change

**Downgrade risk**: The risk that a bond issuer's creditworthiness deteriorates

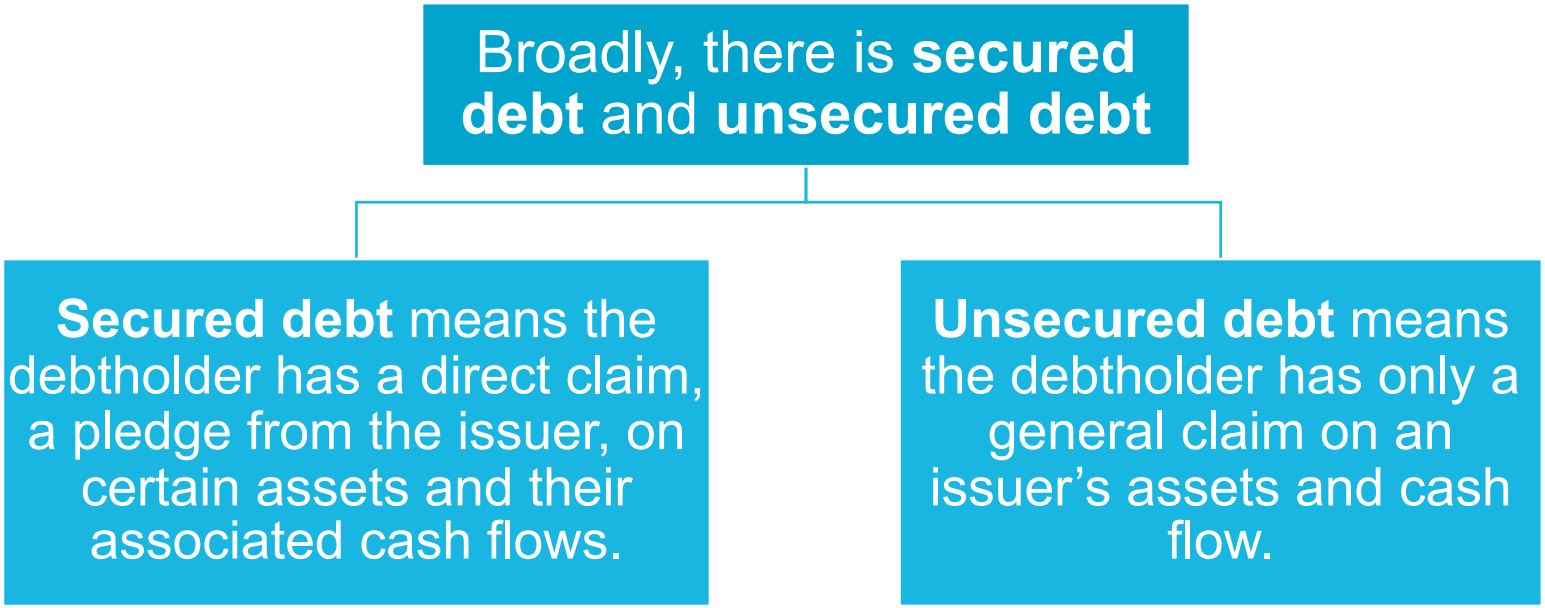
**Market liquidity risk**: The risk that the price at which investors can actually transact—buy or sell—may differ from the price indicated in the market

# MINI-QUIZ #1

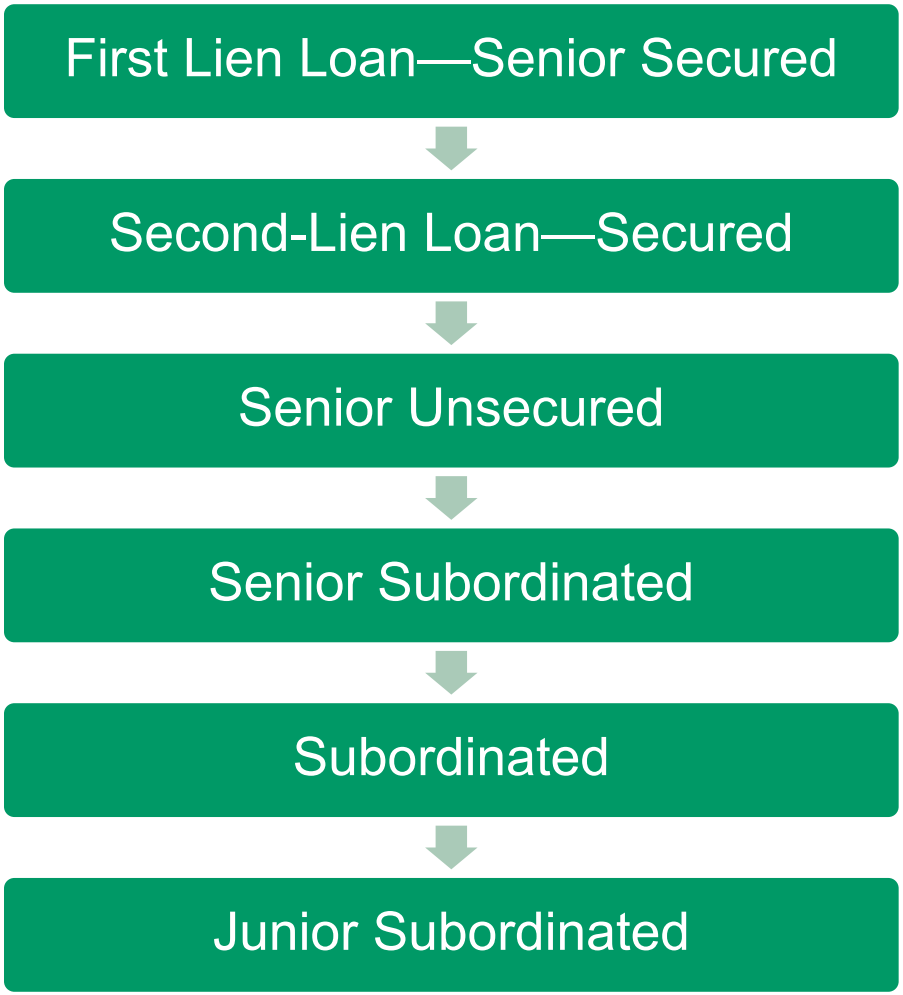
1. Which of the following *best* defines credit risk?
   A . The probability of default times the severity of loss given default
   B . The loss of principal and interest payments in the event of bankruptcy
   C . The risk of not receiving full interest and principal payments on a timely basis
2. Which of the following is the *best* measure of credit risk?
   A . The expected loss
   B . The severity of loss
   C . The probability of default
3. Which of the following is NOT credit or credit-related risk?
   A . Default risk
   B . Interest rate risk
   C . Downgrade or credit migration risk
4. You are asked to play a game by tossing a fair coin. If you toss a tail, you can toss again, until you toss a head. The payout of the game depends on when you toss a head. If the head is at first toss, the payout is \$2; if 2nd toss, the payout is \$4; if 3rd toss, the payout is $\$2^3$… if nth toss, you are paid $\$2^n$. What is the expected payout of this game?

# 3. CAPITAL STRUCTURE, SENIORITY RANKING, AND RECOVERY RATES

- The **seniority ranking** refers to the priority of payment, with the most senior or highest-ranking debt having the first claim on the cash flows and assets of the issuer.
- This level of seniority can affect the value of an investor's claim in the event of default and restructuring.



# SENIORITY RANKING




preferred stock
common stock

# RECOVERY RATES

- All creditors at the same level of the capital structure are treated as one class. This provision is referred to as bonds ranking **pari passu** ("on an equal footing") in right of payment.

Recovery rates vary by seniority of ranking in a company's capital structure, under the priority of claims treatment in bankruptcy.

In theory, the priority of claims in bankruptcy—the idea that the highest-ranked creditors get paid out first, followed by the next level, and so on—is well established. In practice, there might be violations.

# CLASSES OF CLAIMANTS IN BANKRUPTCY

In bankruptcy, there are different classes of claimants, and all classes that are impaired (that is, receive less than full claims) get to vote to confirm the plan of reorganization.

There may be disputes over the value of various assets in the bankruptcy estate or the present value or timing of payouts.

Resolution of these disputes takes time, and cases can drag on for months and years.

Thus, to avoid the time, expense, and uncertainty over disputed issues, the various claimants have an incentive to negotiate and compromise.

This frequently leads to creditors with lower seniority and other claimants (e.g., even shareholders) receiving more consideration than they are legally entitled to receive.

# MINI-QUIZ #2

1. Under which circumstance is a subordinated bondholder *most likely* to recover some value in a bankruptcy without a senior creditor getting paid in full? When:
   A . absolute priority rules are enforced.
   B . the various classes of claimants agree to it.
   C . the company is liquidated rather than reorganized.
2. In the event of bankruptcy, claims at the same level of the capital structure are:
   A . on an equal footing, regardless of size, maturity, or time outstanding.
   B . paid in the order of maturity from shortest to longest, regardless of size or time outstanding.
   C . paid on a first-in, first-out (FIFO) basis so that the longest-standing claims are satisfied first, regardless of size or maturity.
3. You have 2 ropes, each of which takes 1 hour to burn. But either rope has different densities at different points, so there is no guarantee of consistency in the time it takes different sections within the rope to burn. How do you use these 2 ropes to measure 45 minutes?

# 4. RATING AGENCIES, CREDIT RATING, AND THEIR ROLE IN THE DEBT MARKETS

- The three major global credit rating agencies— Moody's Investors Service, S&P, and Fitch Ratings—use **symbol-based ratings** that are basically an assessment of a bond issue's risk of default.
- Rating agencies will also typically provide outlooks on their respective ratings: **positive**, **stable,** or **negative.**

Rating agencies will typically provide both **issuer** and **issue ratings**, particularly as they relate to corporate debt.

| | |
|---|---|
| **Issuer credit ratings** | • address an obligor's overall creditworthiness—its ability and willingness to make timely payments of interest and principal on its debt. |
| **Issue ratings** | • refer to specific financial obligations of an issuer and take into consideration such factors as ranking in the capital structure. |

# RATINGS

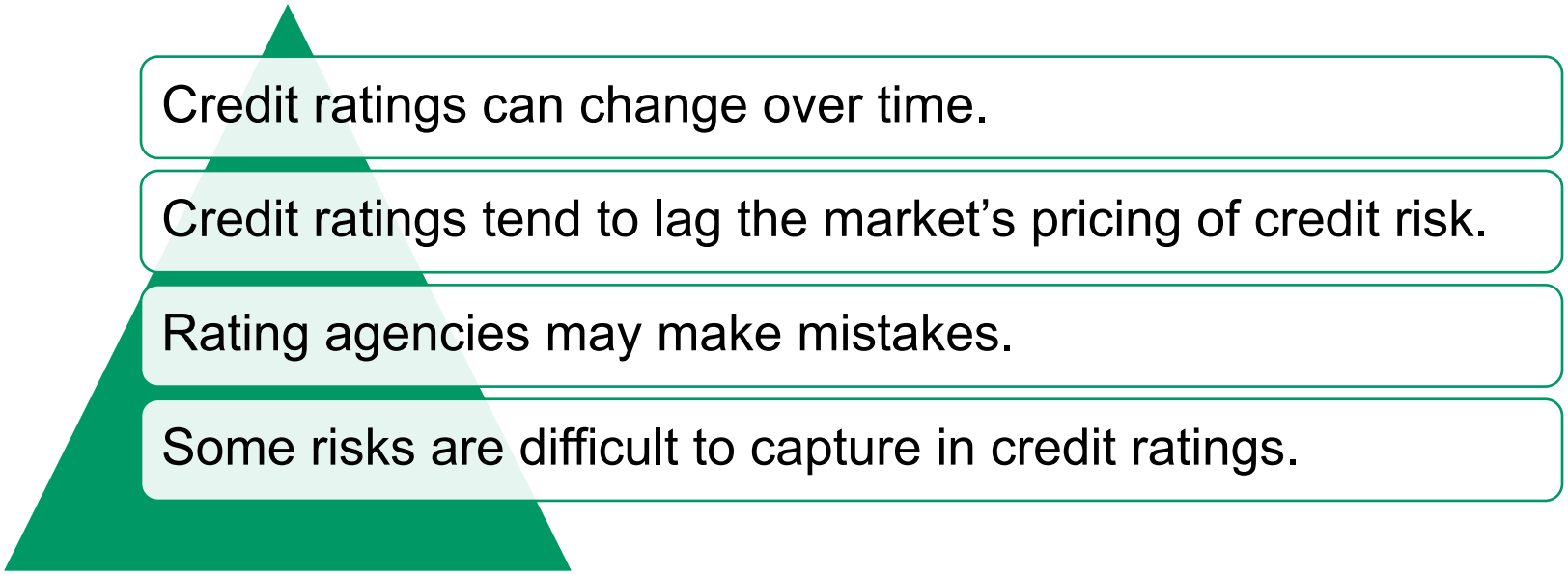
| | | Moody's | S&P | Fitch |
|---|---|---|---|---|
| Investment Grade | High-Quality Grade | Aaa | AAA | AAA |
| | | Aa1 | AA+ | AA+ |
| | | Aa2 | AA | AA |
| | | Aa3 | AA– | AA– |
| | Upper-Medium Grade | A1 | A+ | A+ |
| | | A2 | A | A |
| | | A3 | A– | A– |
| | Low-Medium Grade | Baa1 | BBB+ | BBB+ |
| | | Baa2 | BBB | BBB |
| | | Baa3 | BBB– | BBB– |
| Non-Investment Grade "Junk" or "High Yield" | Low Grade or Speculative Grade | Ba1 | BB+ | BB+ |
| | | Ba2 | BB | BB |
| | | Ba3 | BB– | BB– |
| | | B1 | B+ | B+ |
| | | B2 | B | B |
| | | B3 | B– | B– |
| | | Caa1 | CCC+ | CCC+ |
| | | Caa2 | CCC | CCC |
| | | Caa3 | CCC– | CCC– |
| | | Ca | CC | CC |
| | | C | C | C |
| | Default | C | D | D |

# NOTCHING PROCESS

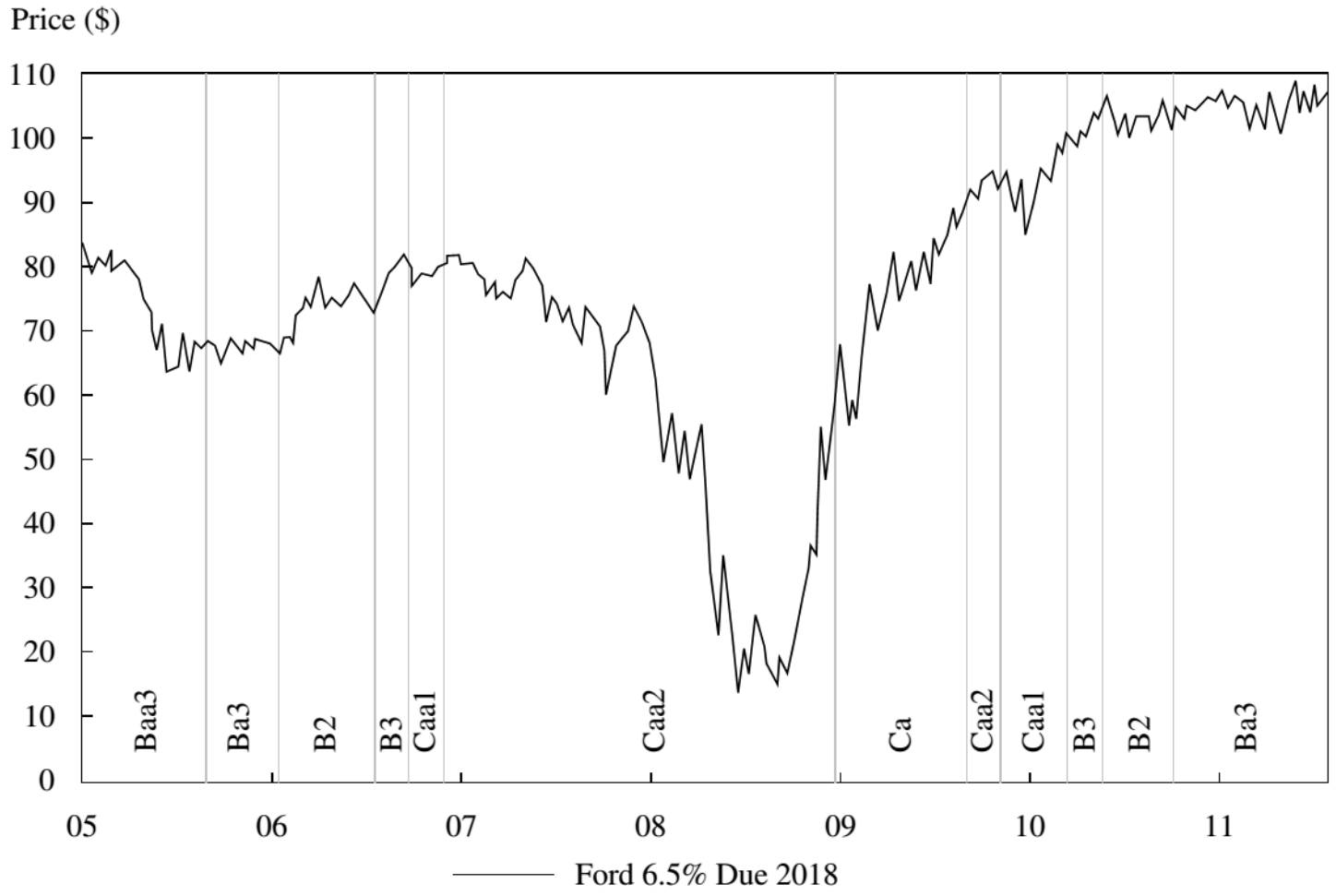

- Recognizing these different payment priorities, and thus the potential for higher (or lower) loss severity in the event of default, the rating agencies have adopted a **notching process** whereby their credit ratings on issues can be moved up or down from the issuer rating, which is usually the rating applied to its senior unsecured debt.

# RISKS IN RELYING ON AGENCY RATINGS

- The ratings of the three major rating agencies have proved quite accurate as a relative measure of default risk, apart from a few exceptions.
- There are limitations and risks, however, to relying on credit rating agency ratings, including the following:



# CREDIT RATINGS TEND TO LAG THE MARKET'S PRICING OF CREDIT RISK



# MINI-QUIZ #3

1. Using both Moody's and S&P ratings, which of the following pairs of ratings is considered high yield, also known as "below investment grade," "speculative grade," or "junk"?
   A . Baa1/BBB–
   B . B3/CCC+
   C . Baa3/BB+

2. What is the difference between an issuer rating and an issue rating?
   A . The issuer rating applies to all of an issuer's bonds, whereas the issue rating considers a bond's seniority ranking.
   B . The issuer rating is an assessment of an issuer's overall creditworthiness, whereas the issue rating is always higher than the issuer rating.
   C . The issuer rating is an assessment of an issuer's overall creditworthiness, typically reflected as the senior unsecured rating, whereas the issue rating considers a bond's seniority ranking (e.g., secured or subordinated).

3. Based on the practice of notching by the rating agencies, a subordinated bond from a company with an issuer rating of BB would likely carry what rating?
   A . B+
   B . BB
   C . BBB–

4. The fixed-income portfolio manager you work with asked you why a bond from an issuer you cover didn't rise in price when it was upgraded by Fitch from B+ to BB.
   Which of the following is the *most likely* explanation?
   A . Bond prices never react to rating changes.
   B . The bond doesn't trade often so the price hasn't adjusted to the rating change yet.
   C . The market was expecting the rating change, and so it was already "priced in" to the bond.

5. Amalgamated Corp. and Widget Corp. each have bonds outstanding with similar coupons and maturity dates. Both bonds are rated B2, B–, and B by Moody's, S&P, and Fitch, respectively. The bonds, however, trade at very different prices—the Amalgamated bond trades at €89, whereas the Widget bond trades at €62. What is the *most likely* explanation of the price (and yield) difference?
   A . Widget's credit ratings are lagging the market's assessment of the company's credit deterioration.
   B . The bonds have similar risks of default (as reflected in the ratings), but the market believes the Amalgamated bond has a higher expected loss in the event of default.
   C . The bonds have similar risks of default (as reflected in the ratings), but the market believes the Widget bond has a higher expected recovery rate in the event of default.

# 5. TRADITIONAL CREDIT ANALYSIS: CORPORATE DEBT SECURITIES

- The goal of credit analysis is to assess an issuer's ability to satisfy its debt obligations, including bonds and other indebtedness, such as bank loans.
- Many analysts perform a so-called **4C analysis**:

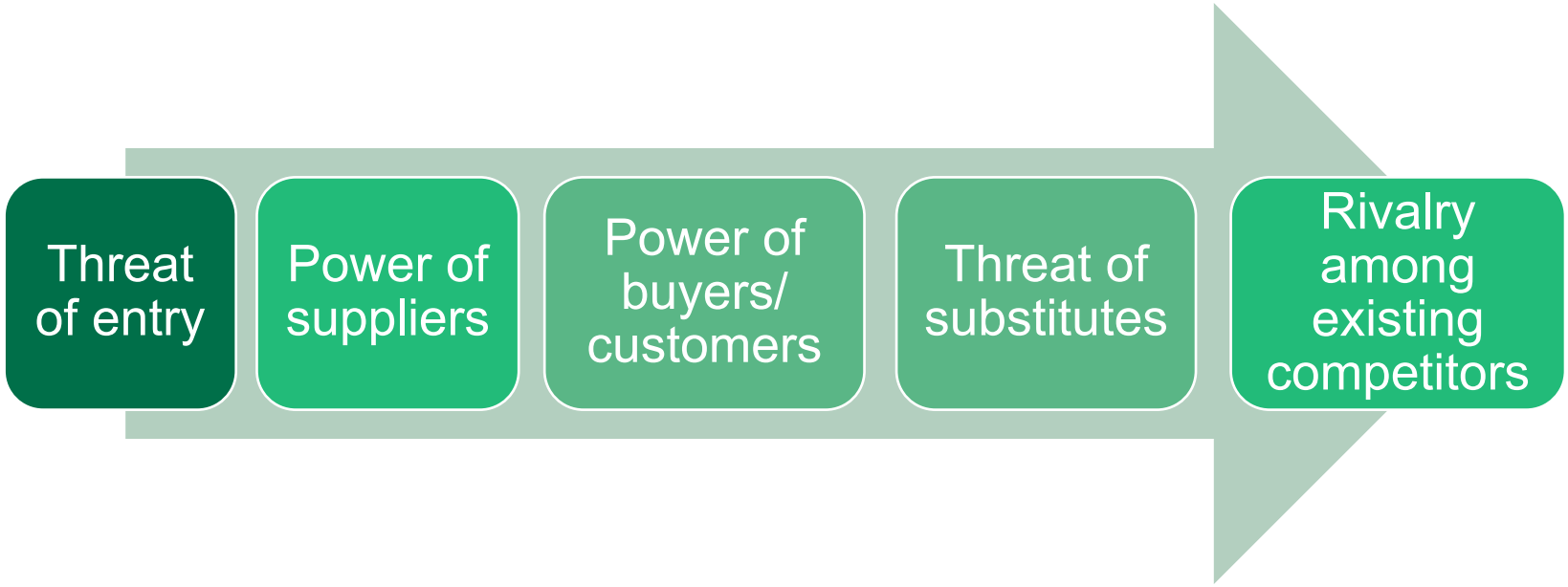
| | |
|---|---|
| **Capacity** | refers to the ability of the borrower to make its debt payments on time. |
| **Collateral** | refers to the quality and value of the assets supporting the issuer's indebtedness. |
| **Covenants** | are the terms and conditions of lending agreements that the issuer must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

# CAPACITY

1C

**Capacity** is the ability of a borrower to service its debt. To determine that, credit analysis starts with industry analysis and then turns to examination of the specific issuer.

Porter's framework of analyzing five competitive forces is useful for the analysis of an industry structure:



# CAPACITY

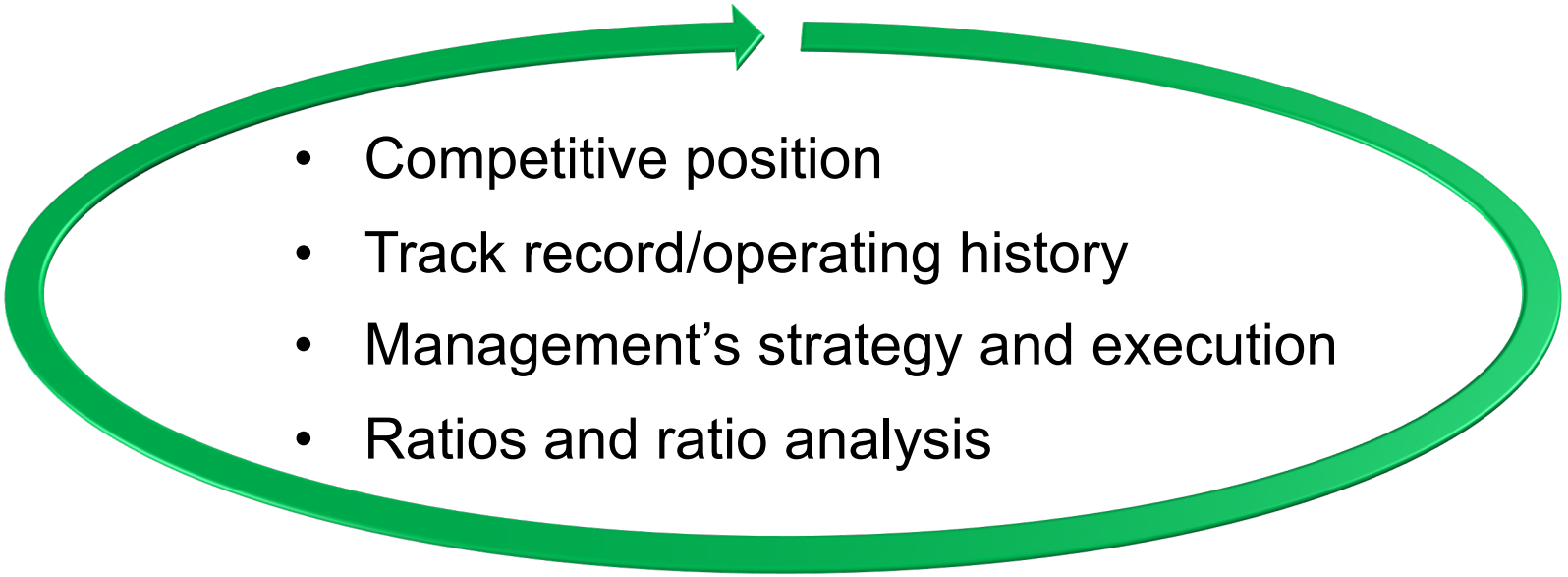
After understanding an industry's structure, the next step is to assess its fundamentals, including its sensitivity to macroeconomic factors, its growth prospects, its profitability, and its business need—or lack thereof—for high credit quality.

- Judgments about these can be made by looking at the following:

# CAPACITY

Following analysis of an industry's structure and fundamentals, the next step is to assess the fundamentals of the company: the corporate borrower.

- Analysts should examine the following:



# CAPACITY

- To provide context to the analysis and understanding of a company's fundamentals—based on the industry in which it operates, its competitive position, its strategy and execution—a number of financial measures derived from the company's principal financial statements are examined.

Key credit analysis measures can be split into the following three groups:

- Profitability and cash flow
- Leverage
- Coverage

# CAPACITY

There are several measures of cash flow used in credit analysis, including the following:

**Earnings before interest, taxes, depreciation, and amortization (EBITDA)**
is equal to operating income plus depreciation and amortization expense.

**Funds from operations (FFO)**
is equal to net income from continuing operations plus depreciation, amortization, deferred income taxes, and other non-cash items.

**Free cash flow before dividends (FCF before dividends)**
can be calculated as net income (excluding non-recurring items) plus depreciation and amortization minus increase in non-cash working capital minus capital expenditures.

**Free cash flow after dividends (FCF after dividends)**
is equal to free cash flow before dividends minus dividend payments.

# CAPACITY

The most common leverage ratios are the following:

| | |
|---|---|
| **Debt/Capital** | • Capital is calculated as total debt plus shareholders equity. This ratio shows the percent of a company's capital base that is financed with debt. A lower percentage of debt indicates lower credit risk. |
| **Debt/EBITDA** | • A higher ratio indicates more leverage and thus higher credit risk. |
| **FFO/Debt** | • A higher ratio indicates a greater ability to pay debt by funds from operations. |
| **FCF after Dividends/Debt** | • A higher ratio indicates that a greater amount of debt can be paid off from free cash flow after dividend payments. |

# CAPACITY

The two most common coverage ratios are the following:

**EBITDA/Interest expense**

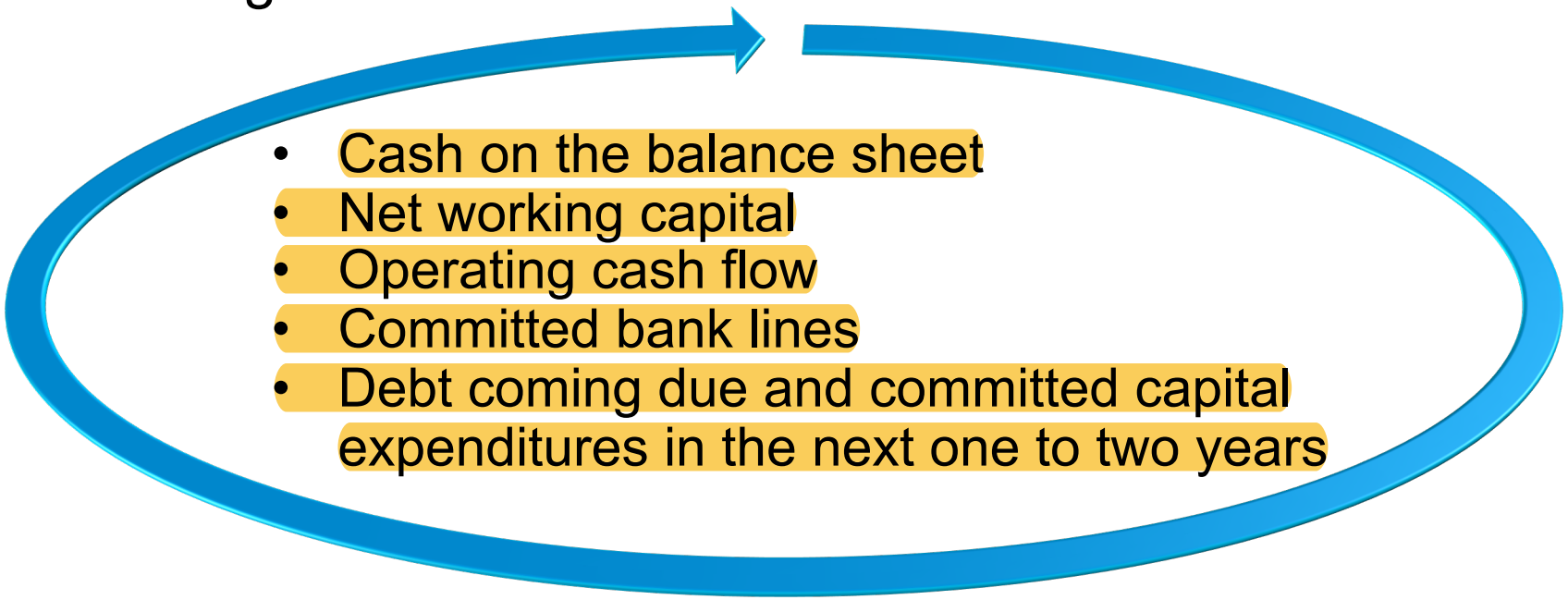
This measurement of interest coverage is a bit more liberal than the one that uses EBIT because it does not subtract out the impact of (non-cash) depreciation and amortization expense. A higher ratio indicates higher credit quality.

**EBIT/Interest expense**

Because EBIT does not include depreciation and amortization, it is considered a more conservative measure of interest coverage. This ratio is now used less frequently than EBITDA/interest expense.

# CAPACITY

- An issuer's access to liquidity is also an important consideration in credit analysis. When assessing an issuer's liquidity, credit analysts tend to look at the following:



# COLLATERAL AND COVENANTS

2C

**Collateral**, or asset value, analysis is typically emphasized more with lower-credit-quality companies. Only when the default probability rises to a sufficient level do analysts typically consider asset or collateral value in the context of loss severity in the event of default.

3C

**Covenants** are meant to protect creditors while also giving management sufficient flexibility to operate its business on behalf and for the benefit of the shareholders. They spell out what the issuer's management is (1) obligated to do (affirmative) and (2) limited in doing (negative).

# CHARACTER

4C

Credit analysts can make judgments about management's **character** in the following ways:

- An assessment of the soundness of management's strategy
- Management's track record in executing past strategies, particularly if they led to bankruptcy or restructuring
- Use of aggressive accounting policies and/or tax strategies
- Any history of fraud or malfeasance
- Previous poor treatment of bondholders

# MINI-QUIZ #4

1. Given a hotel company, a chemical company, and a consumer products company, which is *most likely* to be able to support a high debt load over an economic cycle?
   A . The hotel company, because people need a place to stay when they travel.
   B . The chemical company, because chemicals are a key input to many products.
   C . The consumer products company, because consumer products are typically resistant to recessions.
2. Heavily regulated monopoly companies, such as utilities, often carry high debt loads. Which of the following statements about such companies is *most* accurate?
   A . Regulators require them to carry high debt loads.
   B . They generate strong and stable cash flows, enabling them to support high levels of debt.
   C . They are not very profitable and need to borrow heavily to maintain their plant and equipment.
3. XYZ Corp. manufactures a commodity product in a highly competitive industry in which no company has significant market share and where there are low barriers to entry. Which of the following *best* describes XYZ's ability to take on substantial debt?
   A . Its ability is very limited because companies in industries with those characteristics generally cannot support high debt loads.
   B . Its ability is high because companies in industries with those characteristics generally have high margins and cash flows that can support significant debt.
   C . We don't have enough information to answer the question.

# 6. CREDIT RISK VS. RETURN: YIELDS AND SPREADS

- Typically, the higher the credit risk, the greater the return potential and the higher the volatility of that return.
- The yield on a bond can be decomposed as

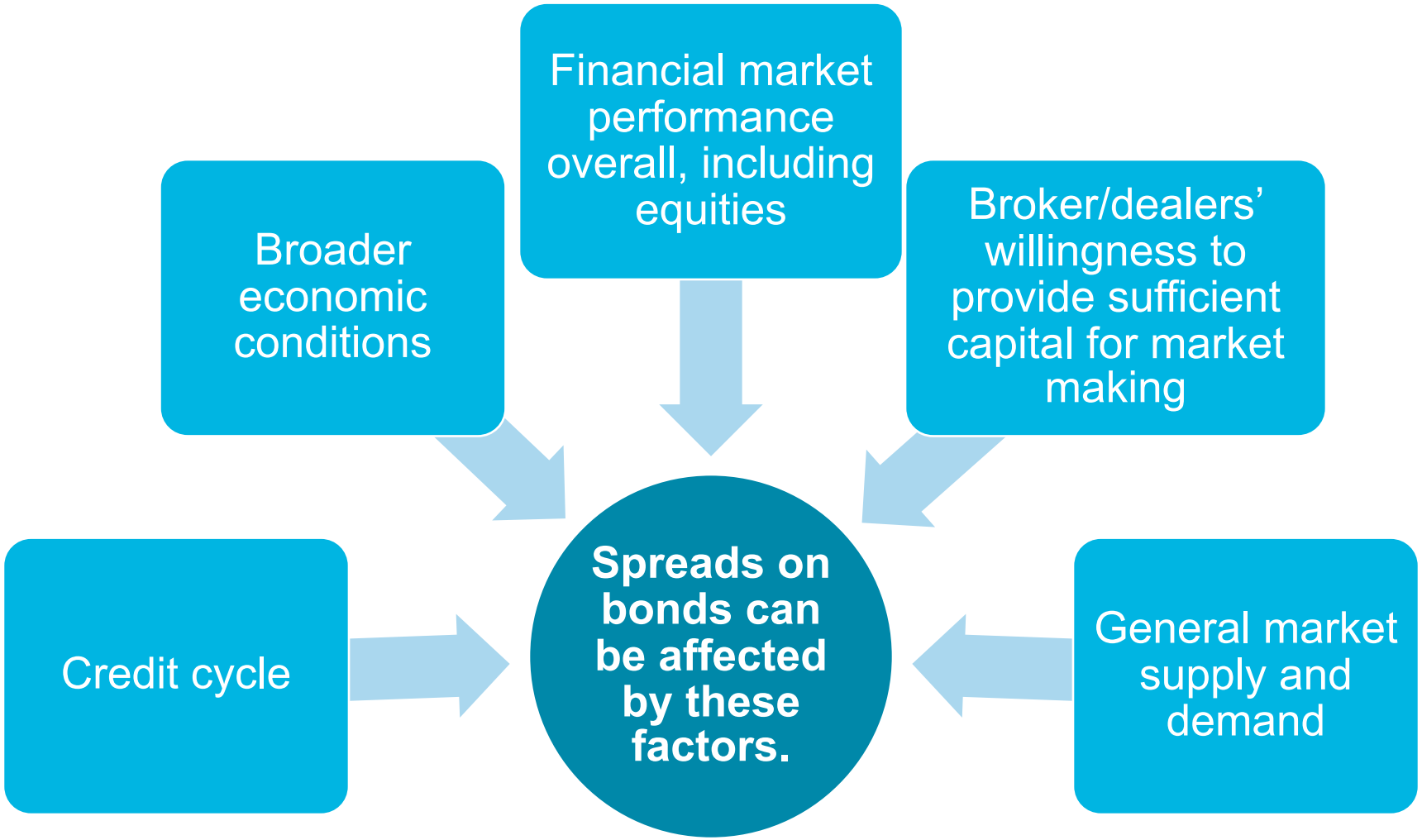
$$\text{Yield} = \text{RFR}_r + E(i) + \text{mp} + \text{lp} + \text{cs}$$

$$\text{Yield spread} = \text{lp} + \text{cs}$$

| | |
|---|---|
| $\text{RFR}_r$ | is the real risk-free rate. |
| $E(i)$ | is the expected inflation rate. |
| mp, lp | is the maturity premium, liquidity premium. |
| cs | is the credit spread. |

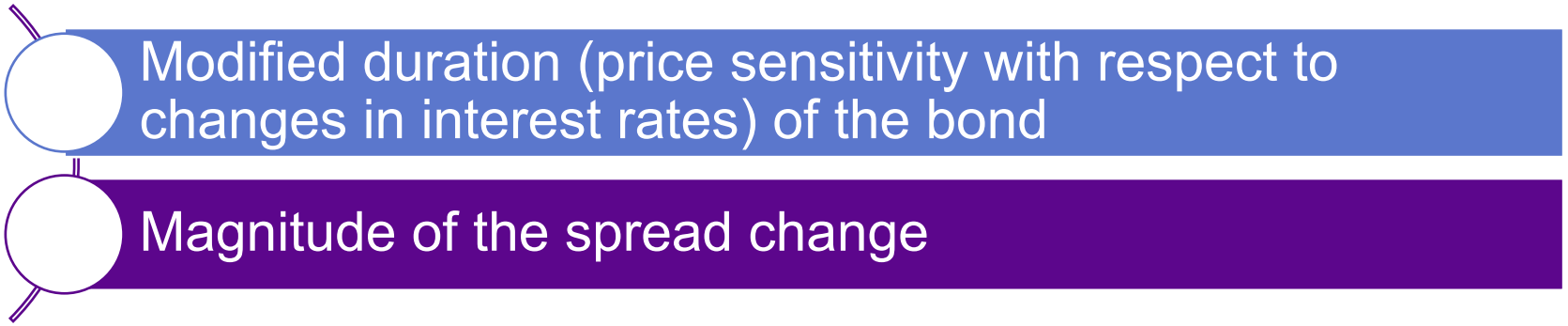
Some government bonds do not have credit risk and liquidity risk components.

# FACTORS THAT AFFECT SPREADS ON CORPORATE BONDS



# FACTORS THAT AFFECT THE PRICE IMPACT FROM SPREAD CHANGES

- The price impact (volatility) from spread changes is driven by two main factors:




- For larger spread changes (and thus, larger yield changes), the impact of convexity needs to be incorporated:

$$\text{Price impact} \approx -\text{MD} \times \Delta\text{Spread} + {}^{1}/_{2} \times \text{Conv} \times (\Delta\text{Spread})^{2}$$

- For small spread changes, the above formula *without* convexity is often used.
- The effect on return to the bondholder depends on the holding period used for calculating the return.

# MINI-QUIZ #5

1. Which bonds are likely to exhibit the greatest spread volatility?
   A . Bonds from issuers rated AA
   B . Bonds from issuers rated BB
   C . Bonds from issuers rated A
2. If investors become increasingly worried about the economy—say, as shown by de-lining stock prices—what is the *most likely* impact on credit spreads?
   A . There will be no change to credit spreads. They aren't affected by equity markets.
   B . Narrower spreads will occur. Investors will move out of equities into debt securities.
   C . Wider spreads will occur. Investors are concerned about weaker creditworthiness.

# 7. SPECIAL CONSIDERATIONS OF HIGH-YIELD, SOVEREIGN, AND NON-SOVEREIGN CREDIT ANALYSIS

**High-yield analysis** is typically more in-depth than investment-grade analysis and thus has special considerations, including the following:

- Greater focus on issuer liquidity and cash flow
- Detailed financial projections
- Detailed understanding and analysis of the debt structure
- Understanding of an issuer's corporate structure
- Covenants
- Equity-like approach to high-yield analysis

# SOVEREIGN CREDIT ANALYSIS

Important considerations in **sovereign credit analysis**

## Institutional effectiveness and political risks

- Effectiveness, stability, and predictability of policymaking and institutions
- Perceived commitment to honor debts

## Economic structure and growth prospects

- Income per capita
- Trend growth prospects
- Sources and stability of growth
- Size of the public sector relative to private sector
- Growth and age distribution of population

# SOVEREIGN CREDIT ANALYSIS

Important considerations in **sovereign credit analysis** (continued)

| External liquidity and international investment position | Monetary flexibility | Fiscal performance, flexibility, and debt burden |
|---|---|---|
| • Status of currency<br>• External liquidity<br>• External debt | • Ability to use monetary policy to address domestic economic objectives (e.g., growth), including exchange rate regime<br>• Credibility of monetary policy<br>• Effectiveness of monetary policy transmission via domestic capital markets | |

# NON-SOVEREIGN CREDIT ANALYSIS

- The credit analysis of non-sovereign general obligation (GO) bonds is similar to sovereign debt analysis.
- The economic analysis of non-sovereign government GO bonds focuses on employment, per capita income, per capita debt, the tax base, demographics, net population growth, and the local infrastructure.
- Analysis should look at the volatility and variability of revenues during times of both economic strength and weakness.
- Revenue bonds, which are issued to finance a specific project, have a higher degree of risk than GO bonds because they are dependent on a single source of revenue.

The analysis of these bonds is a combination of an analysis of the project and the finances around the particular project.

# 8. SUMMARY

## Credit risk and credit-related risks

- Credit risk is the risk of loss resulting from the borrower failing to make full and timely payments of interest and/or principal.
- Credit-related risks include downgrade risk (also called "credit migration risk") and market liquidity risk.

## Default probability and loss severity

- The key components of credit risk are risk of default and loss severity in the event of default.
- The product of the two is expected loss.
- Loss severity = (1 – Recovery rate).

# SUMMARY

## Seniority rankings of corporate debt and the potential violation of the priority of claims

- Debt ranks ahead of all types of equity with respect to priority of payment, and within the debt component of the capital structure, there can be varying levels of seniority.
- A higher priority of claim implies a higher recovery rate—lower loss severity—in the event of default.
- The priority of claims in bankruptcy can be violated due to some leeway accorded to bankruptcy judges, government involvement, or a desire on the part of the more senior creditors to settle with the more junior creditors and allow the issuer to emerge from bankruptcy as a going concern.

## Corporate issuer credit ratings and issue credit ratings

- The ratings agencies rate both issuers and issues. Issuer ratings are meant to address an issuer's overall creditworthiness. Ratings for issues incorporate such factors as their rankings in the capital structure.

# SUMMARY

## Risks in relying on ratings from credit ratings agencies

- There are risks in relying too much on credit agency ratings: (i) Creditworthiness may change over time; (ii) valuations often adjust before ratings change; (iii) ratings do not necessary reflect the severity of loss given default; and (iv) credit ratings agencies may have difficulty forecasting certain credit-negative outcomes.

## The four Cs of traditional credit analysis

- The “4 Cs” of credit—capacity, collateral, covenants, and character—provide a useful framework for evaluating credit risk.

# SUMMARY

## Financial ratios used in credit analysis

- Credit measures are used to calculate an issuer's creditworthiness, as well as to compare its credit quality with that of peer companies. Key credit ratios focus on leverage and interest coverage and use such measures as EBITDA, free cash flow, funds from operations, interest expense, and balance sheet debt.

## Level and volatility of yield spreads

- The yield on a credit-risky bond comprises the yield on a default risk–free bond with a comparable maturity plus a yield premium, or "spread," that comprises a credit spread and a liquidity premium.
- The impact of spread changes on holding period returns for credit-risky bonds is a product of two primary factors: the basis point spread change and the sensitivity of price to yield as reflected by (end-of-period) modified duration and convexity.

# SUMMARY

## Special considerations when evaluating the credit of high-yield, sovereign, and non-sovereign government debt issuers and issues

- For high-yield bonds, with their greater risk of default, more emphasis should be placed on an issuer's sources of liquidity, as well as on its debt structure and corporate structure.
- Covenants analysis is especially important for high-yield bonds.
- In assessing sovereign credit risk, a helpful framework is to focus on five broad areas: (1) institutional effectiveness and political risks; (2) economic structure and growth prospects; (3) external liquidity and international investment position; (4) fiscal performance, flexibility, and debt burden; and (5) monetary flexibility.
- The credit analysis of non-sovereign general obligation bonds has some similarities to sovereign analysis: debt burden per capita versus income per capita, tax burden, demographics, and economic diversity. For revenue bonds, a project analysis methodology is used.

# HOMEWORK

1. The risk that a bond's creditworthiness declines is *best* described by:
   A. credit migration risk.
   B. market liquidity risk.
   C. spread widening risk.
2. Stedsmart Ltd and Fignermo Ltd are alike with respect to financial and operating characteristics, except that Stedsmart Ltd has less publicly traded debt outstanding than Fignermo Ltd. Stedsmart Ltd is *most likely* to have:
   A. no market liquidity risk.
   B. lower market liquidity risk.
   C. higher market liquidity risk.
3. In the event of default, debentures' claims will *most likely* rank:
   A. above that of secured debt holders.
   B. below that of secured debt holders. junior bond
   C. the same as that of secured debt holders.

# HOMEWORK

4. In the event of default, the recovery rate of which of the following bonds would *most likely* be the highest?
   A. First mortgage debt
   B. Senior unsecured debt
   C. Junior subordinate debt
5. If goodwill makes up a large percentage of a company's total assets, this *most likely* indicates that:
   A. the company has low free cash flow before dividends.
   B. there is a low likelihood that the market price of the company's common stock is below book value.
   C. a large percentage of the company's assets are not of high quality.
6. In order to analyze the **collateral** of a company a credit analyst should assess the:
   A. cash flows of the company.
   B. soundness of management's strategy.
   C. value of the company's assets in relation to the level of debt