

Fundamentals of Credit Analysis

Abstract

12a	Calculate and interpret price, income and cross-price elasticities of demand and describe factors that affect each measure
12b	Compare substitution and income effects
12c	Distinguish between normal goods and inferior goods
12d	Describe the phenomenon of diminishing marginal returns
12e	Determine and interpret breakeven and shutdown points of production
12f	Describe how economies of scale and diseconomies of scale affect costs

1. Credit Risk

Credit risk is the risk of loss resulting from the borrower failing to make full and/or timely payments of interest or principal. Credit risk has two components: **default risk** (or default probability) and **loss severity**. Default risk is the probability that the borrower defaults while loss severity is the portion of the bond's value (including unpaid interest) an investor loses in the event of a default (loss severity given default).

These two metrics can be summarize into a single default value: the **expected loss**.

$$E_{loss} = Probability_{default} \cdot LossSeverity \quad (1)$$

Important credit related risks include:

Spread risk The spread risk includes (1) the decline in an issuer creditworthiness (*downgrade risk*) and *market liquidity*

Downgrade risk The downgrade risk or credit migration risk is the risk that the bond's issuer credit score deteriorates and migrates lower, leading investors to believe the risk of default is higher and thus causes spreads to widen and bond's prices to fall.

Market Liquidity risk The is the risk that the price at which investors can actually transact doesn't differ much from the price indicated in the market. If there is not sufficient market liquidity, investors can have an hard time selling the securities, and thus demand additional premium for that.

Market liquidity is indirectly tied with the issuer properties: (1) the size of the issued debt and (2) the credit quality of the issuer. The less outstanding debt, the less frequent the trades and therefore the higher the market liquidity risk. The same goes for the quality of the issuer; the lower the quality of the issuer the higher the market liquidity risk because investors are less likely to invest in such securities.

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2. Capital Structure, Seniority Ranking and Recovery Rates

2.1 Capital Structure

The composition and distribution across debt and equity including all forms of them is referred as the **capital structure**. The capital structure varies greatly among companies and industries, from straightforward capital structures where all the debt is equally ranked and issued by one main operating entity (the firm) or companies (conglomerates) with subsidiaries for which debt for subsidiaries, parent companies and holding companies is quite different in the level of seniority.

2.2 Seniority Ranking

Broadly speaking, there is **secured debt** and **unsecured debt**. Secured debt means the debtholder has direct claim over certain specific assets pledged by the issuer at time of issuing. Unsecured bondholders have only a general claim on an issuer's assets and cash flow.

2.2.1 Priority of Claims

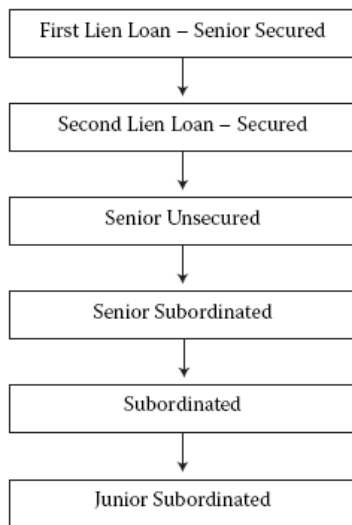


Figure 1

First Mortgage Debt is a first lien debt which refers to the pledge of a specific property (plant)

First Lien Debt refers to a pledge of certain assets which can include buildings, equipment, licenses, patents, etc. There can also be second lien or even third lien.

Senior Unsecured Debt Senior unsecured debt is the highest ranked of unsecured debt and it's also the most common type of all corporate bonds outstanding.

Subordinated Unsecured Debt It includes subordinated debt and junior subordinated debt. It's the lowest priority form of debt and holds the highest loss severity.

2.2.2 Why do companies issue different seniority debt?

Companies as issuers aim to raise the maximum capital with the lowest cost. This process is called the *optimization of their cost of capital* - finding the right mix of the various types of equity and debt.

Issuers offer subordinated debt because (1) it's less expensive than issuing equity and doesn't dilute shareholders' equity (2) it's less restrictive than issuing senior debt (3) investors are willing to buy because they believe the yield offers an adequate compensation for the risk.

2.3 Recovery Rates

The recovery rate is the ability to recover the bond value if a company goes bankrupt and goes through liquidation or reorganization.

Pari Passu Pari passu refers to the provision which states that all creditors in the same level of capital structure are treated equally: both 30 years and 5 years senior unsecured bondholders have the same claims.

Seniority ranking	Emergence Year*			Default Year		
	2017	2016	1987–2017	2017	2016	1987–2017
Bank loans	81.3%	72.6%	80.4%	80.2%	78.3%	80.4%
Senior secured bonds	52.3%	35.9%	62.3%	57.5%	46.9%	62.3%
Senior unsecured bonds	54.1%	11.7%	47.9%	47.4%	29.2%	47.9%
Subordinated bonds	4.5%	6.6%	28.0%	NA	8.0%	28.0%

Figure 2

- **Recovery Rates can vary widely by industry** - recovery rates in declining industries are lower than in industries merely suffering from a cyclical downturn
- **Recovery Rates can also vary depending on when they occur in a credit cycle**
- **Priority of claims is not always absolute.** The priority of claims usually holds in the event of liquidation. However, in practice, creditors with lower seniority and even shareholders can receive some considerations without more senior creditors being paid in full. In case of reorganization, every class of claimant can vote to confirm the plan of reorganization. Therefore, either by consent of the various parts or by a judge's order, absolute priority may not be strictly enforced in the final plan. In addition, these disputes take long and consume too much resources and may help the declining of the company. Thus, in order to avoid that, stakeholders are often encouraged to settle, negotiate and compromise. This frequently leads to creditors with lower seniority to receive more than what they should be entitled to.

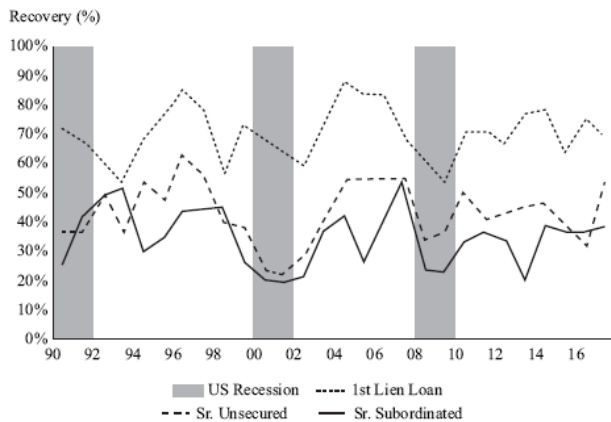


Figure 3

3. Ratings Agencies, Credit Ratings and their Role in the Debt Markets

The main ratings agencies are *Moody's Investors Service* (Moody's), *Standard & Poors* (S&P) and *Fitch Ratings* (Fitch). In addition to these dominant firms, there are other firms such as Dominion Bond Rating Service (DBRS) in Canada and Credit Rating Agency (JCR) in Japan.

The factors contributing to the popularity of credit rating institutions are:

- Independent assessment of credit risk
- Ease of comparison across bond issuers, issues and market segments
- Regulatory and statutory requirements
- Issuer payment for ratings (controversial)
- Huge growth in debt markets
- Development of bond portfolio management and bond indexes

3.1 Credit 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-

Figure 4

		Moody's	S&P	Fitch
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

Figure 5

In addition, rating agencies provide *outlooks* on their respective ratings - *positive*, *stable*, *negative* which can be indicators of the potential direction of their ratings. Other circumstances

are *On review for downgrade/On CreditWatch for Upgrade*. They also provide extensive commentary and financial analysis as well as summary industry statistics.

3.2 Issuer vs Issue Ratings

Rating agencies typically provide both issuer and issue ratings. The terminology includes: **corporate family rating** (CFR) which is assign to a corporate family, **corporate credit rating** (CCR) which is also called the *issuer credit rating* and **issue credit rating** which is the rating of the underlying security a specific corporation (issuer) creates.

In short, the CFR refers to the veil of corporate structure - that is the **structural subordination** between parent, subsidiaries and holding companies. This is important because it shows how money and debt flows within an organization..

3.2.1 Notching

Overall, the cross-default risk or probability is the same for every outstanding obligation, which implies that if issuers fail interest or principal payments to one security, they can also fail to other securities no matter where it sits on the capital structure (secured or unsecured). That being said, because the debt is carried by the same entity, all debt carries a certain amount of shared risk.

This is the baseline for the notching process. The notching process refers to a baseline (usually senior unsecured debt) which captures the default risk. Any additional type of debt such as convertible bonds, subordinated debt or first lien debt are rated by notching (*adjusting*) the senior unsecured debt one or two points down or upward.

- Senior secured debt: +1 or +2 notches above the base (0)
- Senior unsecured debt: 0
- Subordinated debt: -1 or -2
- Junior subordinated debt: -1 or -2
- Preferred stock: -2

Figure 6

3.2.2 Risks in Relying on Agency Ratings

	AAA	AA	A	BBB	BB	B	CCC/C
2014	0.00	0.00	0.00	0.00	0.00	0.78	17.42
2015	0.00	0.00	0.00	0.00	0.16	2.40	26.51
2016	0.00	0.00	0.00	0.00	0.47	3.70	33.17
2017	0.00	0.00	0.00	0.00	0.08	0.98	26.23
Mean	0.00	0.03	0.07	0.19	0.69	3.82	27.98
Max	0.00	0.38	0.39	1.01	2.96	11.53	45.45
Min	0.00	0.00	0.00	0.00	0.00	0.25	9.09

Figure 7. Annual Default Rates by Rating Category

The limitations of credit agency ratings are as follows:

- Credit Ratings can change over time

- Credit Ratings lag the market's pricing of credit risk
Bond prices and credit spreads move faster (either up and down) than credit ratings
- Ratings agencies may make mistakes
- Some risks are difficult to capture in credit ratings (such as litigation risks, environmental, business risks, natural disasters, leveraged acquisitions, stock buybacks, etc)

4. Credit Analysis Framework

4.1 The Four C's of Credit Analysis

The traditional framework to credit analysis is:

- Capacity
- Collateral
- Covenants
- Character

Capacity refers to the ability of the borrower to make its debt payments on time; **Collaterals** refers to the quality and value of the assets supporting the issuer indebtedness; **Covenants** are the terms and conditions of the lending agreement that the issuer must comply and **Character** refers to the quality of the management.

4.1.1 Capacity

A great start for the capacity analysis is by making an industry analysis (Porter's Industry Analysis) followed by a close examination of the specific issuer (company analysis).

Industry's Structure Understand the industry structure, starting with 5 Forces of Porter model.

Industry Fundamentals Understand the fundamental forces driving the industry, including its sensitivity to macroeconomic factors, growth prospects, profitability, ec.

- *Cyclical or non-cyclical* - industries that are cyclical have greater sensitivity to broader economic performance and are generally more volatile
- *Growth prospects*
- *Published Industry Statistics*

Company Fundamentals Including competitive position, operating history, management's strategy and execution, ratios and ratio analysis

Competitive position

- What is the market share?
- How has it changed over time?
- How is the cost structure?
- What sort of financing might be needed to change competitive position?

Operating history

- How has the company performed over time?
- What are the trends of revenues, profit margins and cash flows?
- What is the percentage capital expenditures represent of the revenues?
- What are the trends (financing through debt or equity)?

Management's strategy and execution

- Whats the management strategy for the company: compete or grow?
- How risky it is?
- How different is it from its industry peers?
- How are the industry peers reacting?

Ratios and ratio analysis These include (1) profitability and cash flow, (2) leverage and (3) coverage.

Profitability and cash flow measures Its is from the ability to generate cash flow that companies can serve their debts. Analysts focus on *operating profit margins*, *operating income* (EBIT earnings before interest and taxes) - the reason analysts focus in EBIT is because its useful to determine a company's performance prior to costs arising from its capital structure.

- **EBITDA**
- **Funds from Operations (FFO)**
- **Free cash flow before dividends** (FCF before dividends)
- **Free cash flow after dividends**

Leverage ratios

- Debt/capital (capital is calculated as total debt plus shareholders equity)
- Debt/EBITDA
- FFO/debt
- FCF after dividends/debt

Coverage ratios

- EBITDA/interest expense
- EBIT/interest expense

Credit Rating	EBITDA Margin (%)	Return on Capital (%)	EBIT Interest Coverage (x)	EBITDA Interest Coverage (x)	FFO/Debt (%)	Free Operations Cash Flow/Debt (%)	Debt/EBITDA (x)	Debt/Debt plus Equity (%)
Aaa								
US	66.4	6.5	4.2	21.3	51.9	43.5	-0.2	43.3
Aa								
US	21.9	10.8	15.4	45.0	109.9	58.1	1.2	50.6
A								
US	26.0	13.5	13.3	18.9	49.1	31.8	1.8	51.2
Baa								
US	23.9	11.5	7.2	NA	40.7	20.3	3.9	49.4
Ba								
US	21.7	3.5	4.6	NA	27.7	11.0	4.1	64.0
B								
US	21.2	3.7	2.5	NA	20.3	1.8	5.2	69.3

Figure 8. Industrial Comparative Ratio Analysis

Issuer liquidity

- Cash on the balance sheet
- Net working capital
- Operating cash flow
- Committed bank lines
- Debt due and committed capital expenditures in the next 1-2 years

4.1.2 Collateral

The quality of the collateral is about the assets included in the balance sheet - whether some assets are clearly valuable and can be sold to cover liabilities. Another important factor is the ratio between depreciation and capital expenditure. Low capital expenditures compared to depreciation implies that the firm is insufficiently investing in its business and therefore, it will lead to lower quality assets in the future.

Some businesses have more hard assets and attainable assets such as PP&E whereas others do not and rely more on intellectual capital.

4.1.3 Covenants**4.1.4 Character**

Character was mostly important when loans were given to companies owned by individuals. Nowadays, most bond issuers are publicly owned firms belonging to large groups of shareholders or privately owned by pools of capital. Still, credit analysts can make judgments about the management:

- Assessment of the management strategy
- Management track record
- Use of aggressive accounting policies or tax strategies
- History of fraud
- Previous poor treatment of bondholders or actions leading to credit rating downgrade

5. Credit Risk and Return: Yields and Spreads

Corporate bond yields can be decomposed as the *real risk-free interest rate* of a similar security (either LIBOR rates or treasury), *expected inflation rate* (increase or minus decrease), *maturity premium* (intertemporal rate), *liquidity premium* associated with transaction frictions and finally the credit spread.

$$\text{Yield on corporate bond} = \text{Risk-free rate} + \text{Expected inflation} + \text{Maturity premium} + \text{Liquidity premium} + \text{Credit spread} \quad (2)$$

Spreads on all corporate bonds can be affected by a number of factors, such as:

- **Credit Cycle** As the credit cycle improves, spreads narrow; conversely, deteriorating credit cycle causes spreads to widen
- **Broader economic conditions** Weakening economic conditions increases uncertainty and risks, pushing investors to require additional compensation widening credit spreads
- **Financial markets overall performance**
- **General market supply and demand of securities**

6. Special Considerations on Credit Analysis

6.1 High Yield Securities

Recall high-yield or non-investment grade are bonds rated below Baa3/BBB- by the rating agencies. These are also referred to as junk bonds. Among the reasons why these are so low rated:

- Highly leveraged capital structure
- Weak operating history
- Limited free cash flow
- Poor management
- Lack of competitive advantages
- Declining industry

The analysis of non-investment bonds and companies is usually more complex than investment grade because (a) the probability of default is high enough to not be disregarded as a tail event (black swan) (b) more emphasis on the recovery analysis and loss severity. A few of the special considerations are:

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

Covenant Analysis Key covenants for high-yield issuers include:

- **Change of control put** In the event of an acquisition (change of control), bondholders have the right to force the company to buy back their debt as a put option
- **Restricted payments** Restricts the cash distributed to shareholders
- **Limitations on liens and additional indebtedness** Limits on how much secured debt can a issuer have (its important for unsecured investors)
- **Maintenance covenants** Includes leverage ratios, etc. Breaching these results in the block of further funding and penalties

6.2 Sovereign Debt

The two key issues for sovereign analysis are: (1) the ability of a government to pay (2) its willingness to pay. The willingness for a government to pay its debts is probably the most important issue because due to the principle of sovereign immunity, investors are unable to force a sovereign to pay its debts nor can they sue it.

Institutional profile

- Sound public finances
- Effective and predictability of policymaking institutions
- Track record of managing previous political, economic or financial crisis
- Ability and willingness to implement reforms to address fiscal challenges
- Transparent and accountable institutions
- Independent statistical offices and media
- Respect for rule of law and property rights
- Debt repayment culture

Economic Profile

- Income per capital
- Growth prospects
- Diversity and stability of growth (sovereigns exposed to economic concentration are more vulnerable)

External Profile

- Status of the currency
- External liquidity (supply of foreign currency and foreign currency reserves)
- External debt

Fiscal Profile

- Fiscal performance and flexibility
- Long-term fiscal trends
- Debt burden and structure
- Ability to access funding

Monetary Profile

- Ability to use monetary policies to achieve economic objectives
- Exchange rate regime item Credibility of the monetary policy
- Confidence in the central bank

6.3 Non-Sovereign Government Debt

Non-sovereign issuers include local governments (regional governments), quasi-government entities, states, provinces and cities. As the year 2017, the US Municipal bond market was approximately 3.9 trillion in size, roughly 9% of the total US bond market. The US municipal bond market is composed of both tax-exempt and taxable bonds.

The majority of bonds issued are either **general obligations bonds** (GO) or **revenue bonds**. General obligation bonds are unsecured bonds issued with the full faith and credit of the issuing non-sovereign government. Revenue bonds are issued for specific project financing and its payments may or may not be tied to the performance of such investments.

6.3.1 General obligation bonds

GO bonds are similar to sovereign bonds in the sense analysts must focus on employment, income per capita, per capita debt, tax base, demographics and population growth, job creation/destruction, etc.

	Illinois	Texas
Ratings:		
Moody's	Baa3	Aaa
S&P	BBB–	AAA
Fitch	BBB	AAA
Unemployment rate (%)*		
	4.20	3.70
Median Household Income (\$)***		
	\$61,229	\$57,051
Debt burden, net (\$/rank)***		
Total (millions)	37,374 (5)	11,603 (13)
Per capita	2,919 (6)	410 (42)
As a percent of 2016 personal income	5.60 (5)	0.90 (42)
As a percent of 2016 GDP	4.70 (6)	0.73 (42)
ANPL, net (\$/rank)****		
Total (millions)	250,136 (1)	140,253 (3)
Per capita	19,539 (1)	4,955 (19)
As a percent of 2017 personal income	37.00 (1)	10.60 (19)
As a percent of 2017 GDP	30.50 (1)	8.30 (20)

Figure 9. Comparison of municipal bonds Illinois vs Texas

6.3.2 Revenue bonds

Revenue bonds rely on the analysis of the project. This focus on the project utilization and the economic base supporting it. That is, operating results, cash flow, liquidity, capital structure and the ability to generate income and service debt.

Key measures for revenue-backed non-sovereign bonds is the debt-service coverage (DSC ratio).

References

[cfa, 2019] 2019. *CFA program curriculum*. CFA Institute.