

Chapter 18

CREDIT RISK ANALYSIS AND DEBT CAPACITY

This chapter will cover various methods that a credit analyst uses to measure the ability of the company to pay back its debt applications.

Learning Objectives

After reading this chapter, students will be able to:

- Forecast the major value drivers that impact and could affect the company's future performance.
- Understand ways to measure the ability of a company to repay its debt obligations
- Determine the appropriate financing structure based on debt capacity and propose solutions consistent with risk/reward strategy
- Understanding the five ways to assess the credit worthiness of the company
- Understand and analyze different options when the company files for bankruptcy
- Understand the rating agencies rating scale of default and rate of recoveries.
- Know other types of models that calculate the probability of defaults and rate of recoveries

Credit Risk Analysis and Debt Capacity Overview

[Insert boxed text here]

AUTHOR'S NOTES:

One of my favorite jokes that I heard many years ago goes like this: John was looking out of his window watching this government construction worker. He came every morning, exactly at 8 am, dug a big hole manually with his shovel and left approximately at 9 am. Then around 11 am, another worker came and closed the hole with a spading fork and left around 11.30am. This went on for many days. The first worker will dig the hole and few hours later another worker will cover the hole. John was very curious to what's going on. It looked like each of them, for sure, were working very hard, but they weren't achieving anything meaningful. After the fourth day, John stormed out his house, went across the street and asked the first worker: "Excuse me sir. Sorry to bother you", he said. "What's going on here. You are digging the hole and another guy comes in and covers the hole". The worker looked at John and said: "...well, my job is to dig a hole and the other guy's job is cover the hole. If the guy between us never showed up at 9:30 to plant the tree is not our fault". Lessons learn out of this funny story is that the ultimate purpose of the work done is about planting trees. Even though both workers worked extremely hard, the work was not getting done without the third person. The same with the credit risk analysis. Unlike the valuation methods, discussed in the previous chapter, where each method gives a different prospective in determining the value of the company, all methods used for assessing credit risk depends on each other. For example, even if the company is showing strong income, the credit analyst needs to also

see the strength of its cash flow before lending money to the company – both methods are needed and dependent on each other to make the right assessment, which is to determine the likelihood of the company to pay back its debt obligations.

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KEY TAKEAWAYS:

- *There three parties involved in the analysis of credit: 1. Borrower or issuer; 2. Lender or investor; and 3. Market.*
- *The difference between a credit analysis and a financial analysis is that the credit analysis is based on the likelihood of default and the expected loss if default occurs where the financial analysis is based on the expected return over the risk-free rate or measuring the risk premium.*
- *The credit analyst is trying first to establish a primary source of repayment such as cash and then is trying to measure the secondary source of repayment such as selling assets to recover the debt.*
- *Know the 5Cs in completing the credit analysis: Conditions, Collateral, Character, Capacity and Capital.*
- *Availability of debt is based on market conditions, sometimes referred to as “Credit Cycles” or “Leveraged Cycles”. The availability is based on money supply, credit crunch where banks become very cautious in lending and the cost of the debt that can be volatile through the cycles.*
- *The three independent rating agencies, Standards & Poor’s, Moody’s and Fitch do rate both the loans and the bonds with the intention to measure the risk of credit loss. It’s important to know that these rating agencies are not intent to measure market risk or the prices of these debt facilities as they trade in the secondary market.*
- *For a credit analyst the most important performance measurement is cash flow, not income. This is because cash flow ultimately repays the debt.*

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The chapter follows on from previous chapters on understanding and analyzing financial statements. This works as the basis for analyzing the company that is planning to borrow. The chapter will cover in detail of how a credit analyst goes about running a risk analysis by using various methodologies. The three main areas that the chapter will go over are:

- Review of financial statements and apply credit related ratios
- Debt Capacity Analysis
- Risk and Credit Restructure Analysis

Review of financial statements and apply credit related ratios

Objective of Ratio Analysis and Credit Parameters

As discussed earlier in Chapter 15, all three financial statements including the Income, **Balance**

Sheet and Cash Flow statements serve as the basis for assessment of both financial, equity and credit risk analysis. Each analyst prioritizes and focuses on different sections of these statements because their objectives vary. The objectives for the credit risk analysis are as follows:

- Use the various ratio analysis methods to measure how well the company manages their debt (solvency ratios), how well they manage their cash (liquidity ratios) and how profitable they are and how will they fair in economic turmoil (profitability ratios) once we run various stress case scenarios.
- Use the specific ratio analysis methods to capture asset efficiency, and collateral coverage
- Use the ratio analysis to structure the debt capacity of any company including the appropriate starting leverage and ongoing coverage of the company's contractual debt obligations.
- Build-in warning signal ratios of deterioration such as the Altman Z-score credit parameter.
- Use customized ratios based on industry drivers to measure revenue growth and cost structures and change those to sensitize the company's performance during economic cycles or commodity price fluctuations.

Usefulness of Ratio Analysis

To complete the full credit risk assessment of a company, the analyst should compare ratio results:

1. With past results to establish how well they are trending;
2. With the company's peers to establish how well they are performing versus the benchmark;
3. With the company's budget to establish management credibility of meeting its business plan.

Five areas that the Risk Credit Analysis should focus:

A lot of the commercial banks and institutions that lend money to corporations, as well as credit agencies focus on the following five areas of analysis:

- **Loan to Value or Debt Capitalization ratio:** One of the areas of credit analysis that establishes the position of debt in relationship to other capital raised, such as preferred and common equity and the debt as percentage of the market and book value of enterprise value and real assets, respectively. Figure 19.1 shows that the starting Debt Capitalization ratio starts at 35.4% meeting the Standard & Poor's BB- benchmark of 60%.
- **Leverage Ratio of Debt to EBITDA:** This solvency type ratio, well know as the **Leverage Ratio**, is one of the most popular ratios to analyze the credit of a company. Even few government agencies such as the Board of Governors of the Federal Reserve System (the "Fed Reserve"), the Federal Deposit Insurance Corporation (FDIC) and the Office of the Comptroller of the Currency (OCC) are using this ratio to give guidance to banks to how much debt they should be advancing to companies in a new transaction, such as a Leveraged Buyout (Interagency Guidance of Leveraged Lending – March 2013). On page 7 of the letter by the Federal Reserve, FDIC and OCC states the following: "Credit

agreement covenant protections, including financial performance (such as debt-to cash flow, interest coverage, or fixed charge coverage), reporting requirements, and compliance monitoring. Generally, a leverage level after planned asset sales (that is, the amount of debt that must be serviced from operating cash flow) in excess of 6X Total Debt/EBITDA raises concerns for most industries”.

This ratio is also used by analysts to derive debt capacity and it's incorporated in a lot of the credit agreements as a covenant ratio to measure ongoing performance of the borrower versus their projections. Figure 19.1 shows that the starting Leverage ratio starts at 2.4x meeting the Standard & Poor's BB- benchmark of 4.0x

- **Coverage Ratios including EBITDA / Interest and Cash Flow to Debt Service:** While the two ratios above focus on the debt as in relationship to value or other source of capital or setting up the initial debt as compared to current EBITDA and cash flow, the coverage ratios address the ongoing ability of the company to meet its annual debt obligations. These ratios, such as EBITDA to interest or EBITDA minus Capex to Debt payments are usually found in credit agreements as a covenant ratio. This ratio is a very effective ratio to test when the analyst runs various sensitivity cases to test the ability of the company to pay its debt obligations. For example, if the starting EBITDA to Interest ratio of a transaction is 3.0x, assuming EBITDA of \$90 million and interest expense of \$30 million, then even if EBITDA drops in half, from \$90 million to \$45 million, the \$30 million interest expenses can be covered though the risk of the company has significantly changed. In this example, the credit agreement between the company and banks that have given the loan might have a covenant restriction of 2.0x which means that at 1.5x the company will have a technical default. This technical default will give the bank a reason to increase its interest rate to reflect the new risk before approving to amend a new covenant level or waiving the current level. Figure 19.1 shows that the starting Coverage ratio starts at 5.2x meeting the Standard & Poor's BB- benchmark of 3.0x
- **Run a 30% haircut across operating assumptions to test profitability and cash flow:** Typically, the company will give the bank a business plan which will include financial projections before obtaining a loan. The analyst working for this bank that are in the process of approving a loan will run various sensitivity cases including a case that adjusts down the top line and bottom line income and cash flow by 30% to test how the company can meet such obligations. The 30% threshold is typically used to set up the covenants that will be incorporated in the credit or loan agreement. In Figure 19.1 the model adjusts EBITDA to be 30% lower and measured against Standard & Poor's BB- benchmark. All three ratios above (Debt Capitalization, Leverage and Coverage ratios) are still meeting the Standard & Poor's BB- Benchmark.
- **Adjust and customize operating ratios based on the company's business that can be cyclical, seasonal or depend on commodity pricing:** After the four areas of analysis are run and measured above, the analyst should focus on the specific operating ratios based on the industry drivers. For example, if the credit analyst is analyzing a chemical company where a large portion of its cost of revenue is oil or an oil related commodity such as benzene, the cost of raw material should be sensitized and adjusted for price fluctuations

unless the company has hedging contracts in place to stabilize its cost of materials. In grading the company after applying the measurement ratios including the Leverage and Coverage Ratios, the analyst allows the adjustments (plus or minus) based on the stability or volatility of the company's revenues and/or costs. In Figure 19.1 the credit analysis benchmark shows a threshold of 3.0x Beta business volatility as the maximum level. Celerity Technology shows that the industry that they compete measures volatility or beta at 2.5x, thus no further adjustments needs to be made to assess the credit risk.

The best approach to complete an effective credit analysis is to create a check list and make sure you sure you check every item listed above. Figure 18.1 shows the check points at each area of analysis.

[INSERT FIGURE 18.1]

Celerity Technogy Inc. ("CTI")								
Credit Risk Analysis								
BASE CASE	HISTORICAL		PROJECTED					
	Year -1	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	
Revenues	960,000	1,110,000	1,228,140	1,344,200	1,442,919	1,529,268	1,605,161	
Revenue Growth		15.6%	10.6%	9.5%	7.3%	6.0%	5.0%	
EBITDA	385,000	433,000	493,561	547,928	592,424	629,659	660,688	
EBITDA Margin								
Interest Expense			95,450	99,600	113,450	141,750	157,250	
Tax Expense			129,769	147,070	156,960	158,461	162,851	
Working Capital			(2,870)	4,548	3,869	3,384	2,974	
Capex			138,304	151,374	162,491	172,215	180,761	
Cash on Balance Sheet	45,000	65,800	118,577	179,246	236,183	267,484	278,544	
Total Debt	1,220,000	1,190,000	1,160,000	1,130,000	1,090,000	1,030,000	950,000	
Equity Ownerhip	1,746,000	1,919,800	2,114,453	2,335,059	2,570,498	2,808,190	3,052,467	
Credit Risk Analysis								
1. Debt Capitalization			<input checked="" type="checkbox"/>	35.4%	32.6%	29.8%	26.8%	23.7%
2. Leverage Ratio : Total Debt / EBITDA			<input checked="" type="checkbox"/>	2.4x	2.1x	1.8x	1.6x	1.4x
3. Interest Ratio: EBITDA / Interest			<input checked="" type="checkbox"/>	5.2x	5.5x	5.2x	4.4x	4.2x
4. 30% EBITDA Haircut:	Haircut							
Total Debt / EBITDA (Leveraged Ratio)	30.0%		<input checked="" type="checkbox"/>	3.4x	2.9x	2.6x	2.3x	2.1x
EBITDA / Interest (Coverage Ratio)	30.0%		<input checked="" type="checkbox"/>	3.6x	3.9x	3.7x	3.1x	2.9x
Bench Mark (Target S&P BB- or higher):								
Debt Capitalization			<input checked="" type="checkbox"/>	60.0%	60.0%	60.0%	60.0%	60.0%
Total Debt / EBITDA (Leveraged Ratio)			<input checked="" type="checkbox"/>	4.0x	4.0x	4.0x	4.0x	4.0x
EBITDA / Interest (Coverage Ratio)			<input checked="" type="checkbox"/>	3.0x	3.0x	3.0x	3.0x	3.0x
5. Industry Designation (Industry Beta Sensitivity - needs to be less than 3x)								
Technology			<input checked="" type="checkbox"/>	2.5x	2.5x	2.5x	2.5x	2.5x
Credit Risk Benchmark				3.0x	3.0x	3.0x	3.0x	3.0x

Figure 18.1

Debt Capacity Analysis

Objective of Debt Capacity Analysis

The objective of the debt capacity analysis is to measure the ability to borrow. It refers to the amount of funding that a firm can borrow up to the point where its corporate value no longer increases. There various methods of measuring Debt Capacity. These are as follows:

1. Based on Maximum Leverage Ratio (Total Debt / EBITDA)
2. Based on Loan to Value (Total Debt / Enterprise Value or Total Debt /Total Assets)
3. Based on Debt Coverage Ratio (DCR)

Based on maximum Leverage Ratios (Total Debt / EBITDA)

This ratio which has been one of the most controversial ratios used to measure debt capacity has been changing every year based on risk appetite of the banks. Pre-financial crisis of 2008, leveraged buyout transactions were structured on average of 7.0 times leverage. During the financial crisis any deal that got done was done less than 5.0x and post financial crisis, the leverage ratio climbed up to 6.0x, so on a \$100 mm acquisition of a Company with a \$10 million EBITDA, the \$40mm needs to be paid with Equity (40%) because the market capacity is $6 \times \$10 = \60 million of Debt – the extra multiple (4x on a 10x acquisition multiple) needs to come from Equity. If, for example, the negotiation turns out that the price is raised to \$120mm, the equity needs to make up the difference since the debt level has met its maximum capacity. Figure 18.2 shows that no matter what the acquisition cost is, the debt capacity stays at the same level. In this case Figure 18.1 shows a maximum Senior Debt Leverage (what a bank will be comfortable lending against EBITDA) and total Debt at 6.0x. If the private equity firm negotiating with the company whether to buy the company at 8.0x acquisition multiple of 12.0x the equity adjusts as percentage to the total capital raised.

[INSERT FIGURE 18.2]

DEBT CAPACITY BASED ON TOTAL LEVERAGE (6.0X)						
	EBITDA		EBITDA		EBITDA	
	Multiple X	% Capital	Multiple X	% Capital	Multiple X	% Capital
Cost of Acquisition	8.00x		10.00x		12.00x	
Senior Bank Debt	3.50x	43.8%	3.50x	35.0%	3.50x	29.2%
Corporate Bonds	2.50x	31.3%	2.50x	25.0%	2.50x	20.8%
Total Debt	6.00x	75.0%	6.00x	60.0%	6.00x	50.0%
Equity	2.00x	25.0%	4.00x	40.0%	6.00x	50.0%
Total	8.00x	100.0%	10.00x	100.0%	12.00x	100.0%

Fig. 19.2

As mentioned above, debt capacity involves the assessment of the amount of debt that the company can repay in a timely manner without forfeiting its financial viability. It includes the determination of the appropriate limit to the amount of long-term debt that can remain outstanding at any point of time.

Based on Loan to Value (Total Debt /Total Assets or Total Debt / Enterprise Value)

Many commercial banks have developed the asset-based loan business (ABL) where the debt capacity is based on the book value of the company's assets by multiplying the latest reported assets by an assigned advance rate or loan to value rate. The advanced rate is determined at the time based on the company's strength of assets. For example, cash has the strongest coverage with 100% advance rate and inventory is analyzed closely before applying an advanced rate. Raw materials could be viewed that has higher value than work-in-process inventory or lower than finished good inventory. These categories of inventory are based on comfort level for each bank. The banks developed a list of these assets to loan against, sometimes, referred to eligible assets. Figure 18.3 below shows that Celerity Technology can borrow up to \$1,642 million against the assets based on this method. Many analysts do this type of analysis to determine the strength of secondary source of repayment in addition to other debt capacity methodologies such as using the leverage ratio discussed above or the cash flow capacity method discussed below.

[INSERT FIGURE 18.3]

Celerity Technogy Inc. ("CTI")				
Debt Capacity Analysis based on Loan to Value				
	HISTORICAL		Advanced Rates	Debt Capacity
BASE CASE	Year -1	Year 0	Loan/Value	Year 0
Current Assets				
Cash	45,000	65,800	100%	65,800
Accounts Receivable	45,000	60,000	85%	51,000
Inventories	35,000	40,000	50%	20,000
Prepaid Expenses	10,000	9,000	0%	-
Total Current Assets	135,000	174,800		
Property and Equipment				
Land	2,500,000	2,500,000		
Building	450,000	550,000		
Furniture & Equipment	50,000	75,000		
Total Gross P&E	3,000,000	3,125,000		
Less Accumulated Depreciaition	(300,000)	(365,000)		
Net P&E	2,700,000	2,760,000	50%	1,380,000
Long-Term Investments	200,000	250,000	50%	125,000
Total Assets	3,035,000	3,184,800	Debt Capacity =	1,641,800

Fig. 18.3

Based on Debt Coverage Ratio (DCR)

The Debt Coverage Ratio (DCR) method of calculating debt capacity is similar a Discount Cash Flow (DCF) method of calculating the firm and equity values. The difference is that the stream of cash flows is before debt service and the discount rate used to calculate the present value of these cash flows is the loan rate that the bank will charge the customer based on their risk rating. Figure 18.4 below shows that the maximum debt that can be supported from Celerity Technology's projected cash flows is \$4.4 billion pre-adjusted and \$3.5 billion adjusted. There is a 20% risk appetite cushion used.

[INSERT FIGURE 18.4]

		PROJECTED				
		Year 1	Year 2	Year 3	Year 4	Year 5
Total Revenue		1,228,140	1,344,200	1,442,919	1,529,268	1,605,161
Total Cost of Revenue		(463,078)	(506,823)	(544,053)	(576,709)	(605,474)
Total Operating Expenses		(271,501)	(289,448)	(306,442)	(322,900)	(338,999)
EBITDA		493,561	547,928	592,424	629,659	660,688
Less Capex		(138,304)	(151,374)	(162,491)	(172,215)	(180,761)
Less Working Capital		2,870	(4,548)	(3,869)	(3,384)	(2,974)
Less Taxes		(129,769)	(147,070)	(156,960)	(158,461)	(162,851)
Cash Flow Available for Debt Service		228,358	244,935	269,105	295,599	314,101
		EBITDA Multiple				
Terminal Value (Enterprise Value based on EBITDA Multiple)		7.0x				4,624,814
Cash Flows Available for Debt Service including Terminal Value		228,358	244,935	269,105	295,599	4,938,915
		Loan Rate				
Present Value of Cash Flows Using the Loan Rate		7.00%				
Total Present Value of Cash Flows to support Debt Service		213,419	213,936	219,670	225,511	3,521,378
		Cushion %				
Adjusting for cushion		20.00%				
Maximum Debt based on DCR		(878,783)				
		3,515,131				

Figure 18.4

Risk and Credit Restructure Analysis

Objective of Risk and Credit Structure Analysis

The first part of this chapter focused on credit risks and debt capacity. **These analytical methods are designed to focus primarily on the ability of the company to pay back its debt obligations in a timely fashion and are used by the bank to obtain an approval before the loan was funded.** This section of the chapter will focus on the risk analysis of companies that have already obtained a loan and are now having a hard time meeting their debt obligations. The credit analyst needs to continue its analysis after the transaction is closed. In many distress cases, the bank has the following options:

- Calculate the losses if they decide to sell off their debt investment to other lenders for the best possible price – possibly selling at a discount; or
- Calculate the losses if they decide to stay in the credit and work with the company through their tough times and hopefully they will have a better outcome.

The objective of the risk and credit restructure analysis is to calculate these possibilities, so the bank can have the highest possible recovery described below.

Recovery Analysis

The basic assumption of any recovery analysis is to assume that if the company files for bankruptcy the debt obligations will be considered as claims. Any value that is created by a possible restructuring is first used to repay the highest-priority claim based on the certain ranking - starting from senior secured loans such a bank loan, then second lien loans, then the subordinated debt notes, then pay the preferred equity and last the common equity. Once the claims meet the first level of debt, the remaining residual value can then be applied to the next most senior level of claims, referred to as the “waterfall”. Most of the times though, since the bankruptcy process is a lengthy one and the ultimate decision how the claims are paid are solely relied by the bankruptcy judge decision, recovery rates are not immediately known. Since time to recovery is dependent on the level of control or influence of different creditors suggesting different plan of reorganization, the enforceability of “waterfall” of claims is speculative at best. For larger syndicated loans since there is a secondary market, the price of the loans determines the recovery as it sets the market demand and supply of such distress loan. The analyst might decide that is better to sell the loan at 70% of par rather than wait until a restructuring occurs post-bankruptcy or after the reorganization is approved by the creditors and the courts. Sometimes the company will not pay cash interest during the bankruptcy proceedings, so the loans will be dormant for unknown length of time. To compare the secondary market prices to what the expectation of recovery is post-bankruptcy, the credit analysts should utilize various valuation approaches including the current enterprise value, albeit at distress levels, as well a liquidation value by measuring the fixed asset or examining the current collateral via a collateral analysis.

- **Valuing the enterprise in a distressed scenario:** If the analyst’s view is that the company can continue to operate its business during distress times and possibly come out of bankruptcy with strong growth, then the credit analyst should prepare an enterprise valuation of the company. In such case the most likely course of action will be reorganization of the business and credit analysis should measure the business as a going concern. As it was illustrated in previous chapters of valuating the enterprise, the best approach, even in distress times, is to compare to other companies that are in the same business (peer analysis). Taking the average EBITDA multiple of the company’s peers is first bench mark to be used to determine the value of the company. The approach is to value the business which will continue to operate during and after the restructuring or will be sold as going concern. Once this enterprise is estimated using various methods then these values are compared to the debt outstanding.
- **Collateral Analysis:** Collateral is an asset provided to secure an obligation. Traditionally, banks might require corporate borrowers to commit company assets as

security for loans. Today, this practice is called secured lending or asset-based lending. Collateral can take many forms: property, inventory, equipment, receivables, oil reserves, etc. The collateral analysis is very similar to debt capacity analysis described above -based on loan to value. Basically, the collateral values are based on certain advanced rates that the bank is comfortable lending against (see Figure 19.3 in previous section).

Cost of Capital Analysis

The credit analyst needs to review whether the business can be restructured or whether it will be sold or liquidated and closed.

- **Restructuring Option:** The analyst will need to calculate both the cost of debt and cost of the equity. The cost of debt can be easily found if the debt is trading in the secondary market. This price represents the price an investor is willing to pay to take the debt out. If there is no secondary price, the analyst should assume the cost of debt is in line what the rating expectation will be once the company emerges from restructuring. If the loan emerging out of bankruptcy is anticipated to be rated by Standard and Poor's and/or Moody's, this rating should help establish a benchmark for market price and recovery levels. If the company has different tranches of debt such as corporate loans, unsecured notes or subordinated notes, each of these will be priced based on their specific rating. The price of debt is expected to be reduced during restructuring and depended of what the restructuring looks lie the cost will settle at that price. This is important, so the analyst can price-in the expected recovery rate. The cost of equity is more difficult to measure given that, by definition, is the last on the waterfall for receiving any payment during the restructuring. One of the methods of valuing the equity is using a call option methodology as described in Chapter 18 - method 8. Basically, the equity value thesis is that there is some value for an on-going business on post restructuring basis like a call option that is currently out of the money but anticipated that after the restructuring the value will move up from negative to be positive, in-the-money given a certain time.

Business Sale Option: Despite the distress level that the company is in, the value of the business could be very attractive. More often than none, the company is relatively healthy if you strip out the debt. There are plenty of examples where a distress buyer has stepped in and renegotiated with the banks to buy the company at a discount and then the company not only survives after the sale but thrives in the future under new management. The credit analyst needs to run this option if the restructuring option does not work. The value of such business is calculated based on what is someone willing to pay for the business via Discount Cash Flow method or comparable EBITDA multiples method discussed in depth in Chapter 18. Once the enterprise value is calculated then the analyst can measure the recovery rate which is the ratio of the Enterprise value to Debt.

- **Liquidation Option:** When the restructuring and the sale of the business option are not feasible, the credit analyst will look then to find value in the real assets (instead of financial assets or Enterprise Value). Figure 18.5 shows that the maximum recovery based on

Celerity Technology assets is 1.0x assuming certain distress asset based modified advance rates (discount rates) and subtracting all the trade and tax claims. The total claims based on this analysis is \$1,244 million against total debt of \$1,190 million.

INSERT FIGURE 18.5

Celerity Technology Inc. ("CTI")				
Liquidation Values				
	HISTORICAL		Distress Advanced Rates Loan/Value	Debt Capacity Year 0
	Year -1	Year 0		
BASE CASE				
Current Assets				
Cash	45,000	65,800	100%	65,800
Accounts Receivable	45,000	60,000	60%	36,000
Inventories	35,000	40,000	35%	14,000
Prepaid Expenses	10,000	9,000	0%	-
Total Current Assets	135,000	174,800		
Property and Equipment				
Land	2,500,000	2,500,000		
Building	450,000	550,000		
Furniture & Equipment	50,000	75,000		
Total Gross P&E	3,000,000	3,125,000		
Less Accumulated Depreciaition	(300,000)	(365,000)		
Net P&E	2,700,000	2,760,000	40%	1,104,000
Long-Term Investments	200,000	250,000	40%	100,000
Total Assets	3,035,000	3,184,800	Asset Coverage =	1,319,800
Liabilities and Owners Equity				
Current Liabilities				
Accounts Payable	35,000	40,000	100%	(40,000)
Accrued Income Taxes	12,000	10,000	100%	(10,000)
Accrued Expenses	10,000	8,000	100%	(8,000)
Current Portion of Long Term Debt	20,000	10,000		
Total Current Liabilities	77,000	68,000		
Long-Term Debt:	1,200,000	1,180,000		
Deferred Income Taxes	12,000	17,000	100%	(17,000)
Total Liabilities	1,289,000	1,265,000		
Owners' Equity				
Common Stock	1,000,000	1,000,000		
Paid-in-Capital	-	25,000		
Retained Earnings	746,000	894,800		
Total Owners' Equity	1,746,000	1,919,800		
Total Liabilities & Owner's Equity	3,035,000	3,184,800		
Error Check	-	-		
			Trade/tax Claims =	(75,000)
			Net Value =	1,244,800
			Short Term Debt =	10,000
			Long-Term Debt =	1,180,000
			Total Debt =	1,190,000
			Value/Total Debt =	1.046x

Fig. 18.5

Corporate Credit and Recovery Scores by Rating Agencies and Other

Credit rating agencies, such as Standard & Poor's, Moody's and Fitch grade companies that raised debt in the capital markets. The rating levels represent a proxy for default risk and the recovery rates issued is a proxy for recovery expectation. The combination of the two represents the probabilities of default and expected loss.

Figure 18.6 shows the rating levels by each of the rating agencies. Each level represents an opinion of the creditworthiness of an obligor. Even though the symbols differ between rating agencies, the three scales are set the same.

INSERT FIGURE 18.6

CREDIT RATING AGENCIES' SCALES

Description		Standard & Poor's	Moody's	Fitch	
Highest Quality (Risk Free)	INVESTMENT GRADE	AAA	Aaa	AAA	
High Quality		AA+	Aa1	AA+	
		AA+	Aa2	AA+	
		AA-	Aa3	AA-	
Strong Payment Capacity		A+	A1	A+	
		A+	A2	A+	
		A-	A3	A-	
Adequate Payment Capacity		BBB+	Baa1	BBB+	
		BBB	Baa2	BBB	
		BBB-	Baa3	BBB-	
Likely to fulfill Obligations	NON-INVESTMENT GRADE (LEVERAGE)	BB+	Ba1	BB+	
		BB	Ba2	BB	
		BB-	Ba3	BB-	
High-risk Obligations		B+	B1	B+	
		B	B2	B	
		B-	B3	B-	
Current Vulnerable to Default		DISTRESS	CCC+	Caa	CCC
			CCC		
			CCC-		
			CC		
	C				
Default		D	D	DDD,DD,D	

Figure 18.6

Every year the rating agencies will publish the actual historical probability of default based on rating. As an example, AAA issuer has 0.0% probability of default and CCC has 31.0% for a year. The agencies also place the probability of default for longer maturities.

The Standard & Poor's recover ratings focuses on expected recovery in the event of a payment default. The recovery rating is based on 1+ to 6 numerical rating that correspond to recovery percentage of the debt outstanding as described in Figure 18.7 below:

INSERT FIGURE 18.7

STANDARD & POOR'S RECOVERY RATES

Description	Recovery Rates	Recovery % of Outstanding
Highest Expectation of full recovery in the event of default	1+	100%
Expectation of Very High	1	90%-100%
Expectation of substantial	2	70%-90%
Expectation of Meaningful	3	50%-70%
Expectation of Average	4	30%-50%
Expectation of Modest	5	10%-30%
Expectation of Negligible	6	0%-10%

Figure 18.7

The combination of the probability of default and recovery rates could be used by the credit analyst to calculate the expected losses on the outstanding of the debt.

Other Probability of Default and Recovery Models

Other statistical models were created over the years such the Altman's Z-Score, Merton Model and KMV. A well know ratio used for measuring the company's ability to manage debt, especially manufacturing companies is the Altman's Z-Score. The ratio which is heavily testing the relationship of the primary source of repayment such cash and income to the secondary source of repayment such as fixed assets. The Z-score created and developed by NYU professor Dr. Edward Altman is the measurement of the likelihood of bankruptcy. This ratio is built to include all the ratios discussed in Chapter 16 including profitability, liquidity, solvency and activity ratios as follows:

$$\mathbf{Z\text{-}Score = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E}$$

where, A = working capital / total assets; B = retained earnings / total assets; C = earnings before interest and tax / total assets; D = market value of equity / total liabilities; E = sales / total assets.

The Merton Model developed in 1974 uses basic option pricing that looks at the relationship between credit risk and the financial structure of the company. It assumes that the equity holders hold a call option and the debt holders hold a put option. The default happens at maturity of the debt (similar to a European type option pricing method such Black-Scholes) if the enterprise value is lower than the strike price or debt levels.

The KMV is a newer model used by may banks to analyze the likelihood of default based on Expected Default Frequency (EDF) which is basically a probability of default mechanism to give

the credit analyst a warning signal.

CASE STUDY AND PRACTICE CASES

1. Based on the information below, complete the projected spreadsheet. (access spreadsheet www.professordrou.com)

TO BE PROVIDED LATER

References (Chapter 18)

TO BE PROVIDED LATER