

**LECTURE #5**

**MARKET & CREDIT RISK ANALYSIS**

**Market Risk / Systematic Risk Concepts / Terms:**

- **Liquidity**
- **Interest Rates**
- **Event Driven / Sovereign Risk Greece/Ireland- Russia in 1997**

**Credit Risk Concepts / Terms:**

- **Leverage / Coverage Ratios / Debt Service Ratio**
- **Default Rates / Distance to Default**
- **Recovery Rates**
- **Loss Given Default (LGD) and the BASEL Accord**
- **Exposure at Default (EAD)**
- **Value at Risk (VaR)**

**Company Specific Credit Risk V Portfolio Credit Risk**

**Company Specific Credit Risk – Fundamental Analysis:**

**Debt Capacity:**

Debt capacity is the ability to borrow. It refers to the amount of funding that an organization can borrow up to the point where its corporate value no longer increases.

Based on maximum Leverage Ratios (Total Debt / EBITDA)

i.e. the market in 2010 for a new deal can leverage 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  $6x\$10 = \$60$  million of Debt – the extra multiple (4x on a 10x acquisition multiple) needs to come from Equity... If the negotiation turn that the price is \$120mm, the equity needs to make the difference:

<b>Sources</b>	<b>10x</b>	<b>12x</b>	<b>Uses</b>	<b>10x</b>	<b>12x</b>
Debt	60	60	Purchase Price	100	120
Equity	40	60			
Total	100	120		100	120

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Debt capacity involves the assessment of the amount of debt that the organization 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. It also refers to the total amount of debt a firm can incur within the constraints of its articles of association.

Lenders often use a Debt Coverage Ratio (DCR) to determine debt capacity. 'Cashflow Available to Pay Debt' or EBITDA are often used as a numerator. The denominator is the debt payments due (both principal and interest) during that period.

Before the economic downturn 1.2 was often considered adequate. In summer of 2009 the lenders are more comfortable with 1.3. The amount of liquidity and other factors can impact the desired DCR. This ratio is also called a Debt Service Ratio.

**$(\text{EBITDA} - \text{Capex} - \text{Cash Taxes}) / (\text{Interest} + \text{Principal Payment}) = > 1.0$  or w cushion at 1.2x**

**or  $\text{FCF} / \text{Interest} = \text{Debt Capacity}$**

### Collateral Analysis

**Collateral** is assets 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.

	Advance Rates (ABL Facility)	BV of Assets (\$ mm)	Debt Capacity based on Collateral
Cash	100%	50.00	50.00
A/R	85%	200.00	170.00
Inventory	50%	150.00	75.00
Fixed Assets	50%	300.00	150.00
Investments	50%	100.00	50.00
Total		800.00	495.00

A more recent development is **collateralization arrangements** used to secure [repo](#), [securities lending](#) and [derivatives](#) transactions. Under such arrangement, a party who owes an obligation to another party posts collateral—typically consisting of cash or [securities](#)—to secure the obligation.

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In the event that the party defaults on the obligation, the secured party may seize the collateral. In this context, collateral is sometimes called **margin**.

An arrangement can be unilateral with just one party posting collateral. With two-sided obligations, such as a [swap](#) or foreign exchange [forward](#), bilateral collateralization may be used. In that situation, both parties may post collateral for the value of their total obligation to the other. Alternatively, the net obligation may be collateralized—at any point in time, the party who is the net obligator posts collateral for the value of the net obligation.

In a typical collateral arrangement, the secured obligation is periodically marked-to-market, and the collateral is adjusted to reflect changes in value. The securing party posts additional collateral when the [market value](#) has risen, or removes collateral when it has fallen. The collateral agreement should specify:

- **Acceptable collateral:** A secured party will usually prefer to receive highly rated collateral such as Treasuries or agencies. Collateral whose market value is volatile or negatively correlated with the value of the secured obligation is generally undesirable.
- **Frequency of margin calls:** Because the value of an obligation and the value of posted collateral can change, a secured party typically wants to mark-to-market frequently, issuing a margin call to the securing party for additional collateral when needed.
- **Haircuts:** In determining the amount of collateral that must be posted, haircuts are applied to the market value of various types of collateral. For example, if a 1% haircut is applied to Treasuries, then Treasuries are valued at 99% of their market value. A 5% haircut might be applied to certain corporate bonds, etc.
- **Threshold level:** Only the value of an obligation above a certain threshold level may be collateralized. For example, if a USD 1MM threshold applies to a USD 5MM obligation, only USD 4MM of the obligation will actually be collateralized.
- **Close-out and termination clauses:** The parties must agree under what circumstances the obligation will be terminated. The form of a final settlement in the event of such termination and the role of the collateral in such settlement is specified.
- **Valuation:** A methodology for marking both the obligation and the collateral to market must be agreed upon.
- **Rehypothecation rights:** The secured party may wish to have use of posted collateral possibly lending it to another party or posting it as collateral for its own obligations to another party. Rehypothecation is not permitted in many jurisdictions.

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Legal treatment of collateral varies from one jurisdiction to another. In some jurisdictions, the secured party takes legal possession of collateral, but is legally bound by how the collateral may be used and the conditions upon which it must be returned. Such transfer of title provides the secured party a high degree of assurance that it may seize the collateral in the event of a default. Transfer of title, however, may be treated as a taxable event in some jurisdictions. In other jurisdictions, the securing party retains ownership of collateral, but the secured party acquires a [perfected](#) interest in it.

### Cash Flow Analysis

#### Cash Flow Analysis (Debt Capacity)

		0	1	2	3	4	5
	Assumptions						
Revenue	5.00%	100.0	105.0	110.3	115.8	121.6	127.6
CoGS	65.00%		(68.3)	(71.7)	(75.2)	(79.0)	(83.0)
Oper. Exp.	10.00%		(10.5)	(11.0)	(11.6)	(12.2)	(12.8)
<b>EBITDA</b>			<b>26.3</b>	<b>27.6</b>	<b>28.9</b>	<b>30.4</b>	<b>31.9</b>
Less Capex	5.00%		(5.3)	(5.5)	(5.8)	(6.1)	(6.4)
Less Cash Taxes (% of EBIT)	40.00%		(12.6)	(13.2)	(13.9)	(14.6)	(15.3)
Less WC	2.00%		(2.1)	(2.2)	(2.3)	(2.4)	(2.6)
<b>CFADS</b>			<b>6.3</b>	<b>6.6</b>	<b>6.9</b>	<b>7.3</b>	<b>7.7</b>
Terminal Value (based on EBITDA)	6.0x						191.4
<b>PV</b>		<b>157.9</b>	<b>6.3</b>	<b>6.6</b>	<b>6.9</b>	<b>7.3</b>	<b>199.1</b>
Interest Rate (Cost of Funds)	8.00%						
Cushion	20.00%						
Debt Capacity		126.31					
<b>Leverage</b>		<b>4.8x</b>					

\* Adj for Depr = same as Capex

### Portfolio Credit Risk – Technical Analysis:

**Credit assessment** - institutions manage credit risk, calculate economic and regulatory capital, and manage their balance sheets more effectively. Major components of an internal rating system, includes tools and methodologies for the analysis of probability of default, loss given default, and exposure at default.

**Loss Given Default** or **LGD** is a common parameter in Risk Models and also a parameter used in the calculation of [Economic Capital](#) or [Regulatory Capital](#) under [Basel II](#) for a banking institution. This is an attribute of any exposure on bank's client. Exposure is the amount that one may lose in an investment.

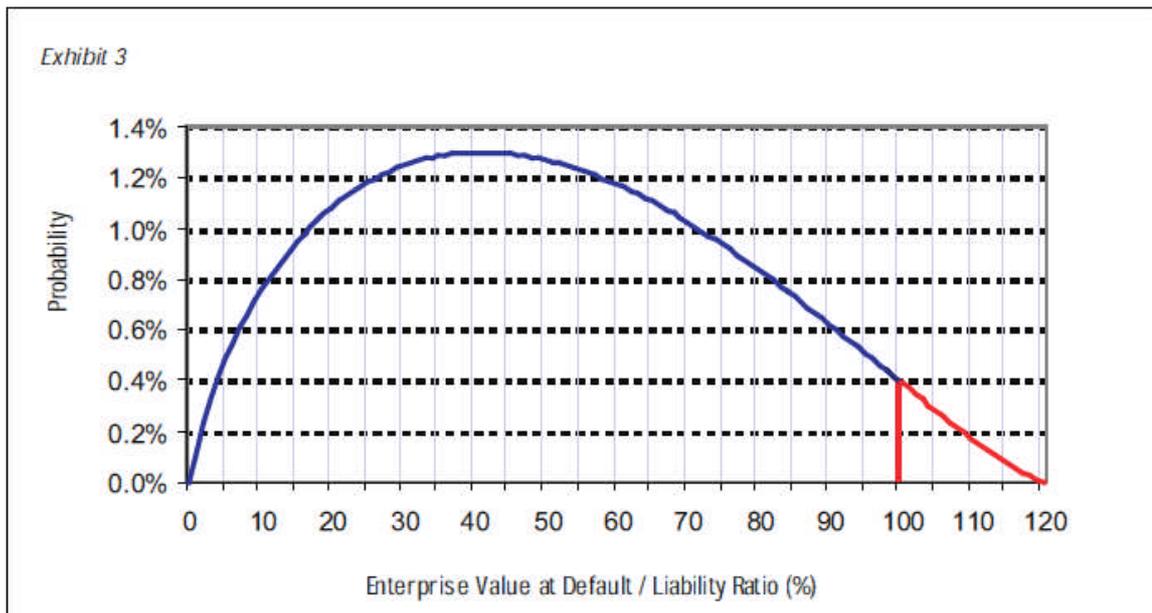
$$\text{LGD} = \text{Default} * (1 - \text{Recovery})$$

**Basel Accord:** The New Basel Accord, expected to be implemented at year-end 2006, will require internationally active banks to use more risk sensitive methods for calculating credit risk capital requirements

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**Default** measure is derived from an annualized expected default rate. By definition, a debt instrument can experience a loss only if there has been a default. However, there is no standard definition of what constitutes a default. Different definitions may be used for different purposes. Typically a default occurs when any of the following conditions are met:



- A loan is placed on non-accrual
- A charge-off has already occurred
- The obligor is more than 90 days past due
- The obligor has filed bankruptcy

The BIS reference definition of default for purposes of the New Basel Accord reflects many of these events:

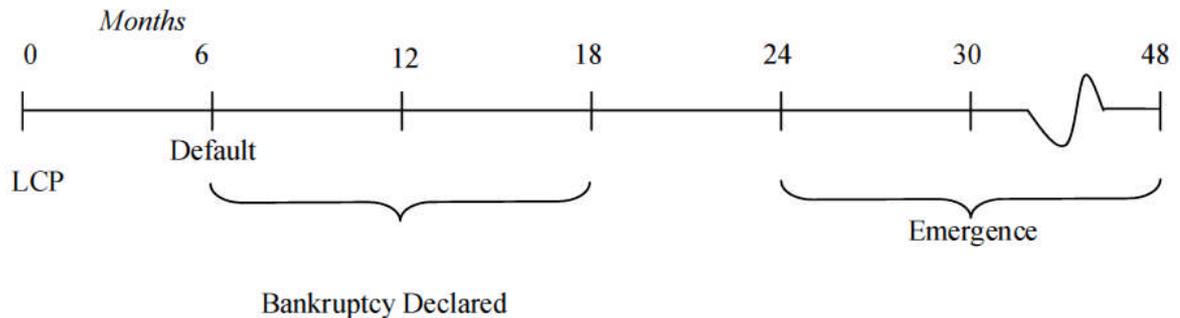
“A default is considered to have occurred with regard to a particular obligor when one or more of the following events has taken place.

- (a) It is determined that the obligor is unlikely to pay its debt obligations (principal, interest, or fees) in full;
- (b) A credit loss event associated with any obligation of the obligor, such as charge-off, specific provision, or distressed restructuring involving the forgiveness or postponement of principal, interest, or fees;
- (c) The obligor is past due more than 90 days on any credit obligation; or
- (d) The obligor has filed for bankruptcy or similar protection from creditors.”

**Timeline of a distress firm:**

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A firm in distress typically goes through four stages as is illustrated in the timeline above.

1. **LCP**: the last cash paid date is known only ex post but serves as an anchor to the chronology.
2. **Default** is considered to occur at some later point, for bonds typically six months later. Default is often defined when a coupon or interest payment is missed. The six month delay between last cash paid and default results from coupons on bonds typically being paid twice yearly.
3. **Bankruptcy** (usually Chapter 11) is declared anywhere from the time of default to about a year later. A firm can default on debt obligations and still not declare bankruptcy depending on the negotiations with its creditors.
4. **Emergence** from bankruptcy proceedings, either via liquidation or genuine emergence as a going concern, typically occurs anywhere from two to four years after the last cash paid. Cash flows from distressed instruments may occur throughout this process, although the bulk comes during or immediately after emergence when restructuring plans and additional financing (e.g. debtor-in-possession lending) are in place.

The time spent in bankruptcy can dramatically reduce the value of debt recovery. The average time spent in bankruptcy is around two years (Helwege (1999), Eberhart, Altman and Aggarwal (1998), Gupton, Gates and Carty (2000), Garbade (2001)) which is reflected in our timeline. Bond-only studies indicate that the average time in bankruptcy is a bit longer, more like 2½ years (Wagner (1996), Eberhart and Sweeny (1992)). Helwege (1999) finds that the presence of contingent claims (e.g. unfunded pension liabilities) and size (a proxy for complexity) tend to lengthen bankruptcy proceedings.

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### **Altman's Z-SCORE**

#### **Z Formula**

$$Z = 1.2x(WC/TA) + 1.4x(RE/TA) + 3.3x(EBIT/TA) + 0.6x(MVE/Liabilities) + 0.99x(Sales/TA)$$

WC = Working Capital

TA=Total Assets

RE=Retained Earnings

MVE=Market Value of Equity

<b><u>Z-Score</u></b>	<b><u>Bankruptcy</u></b>
1.8x or less	Likely
Between 1.8 - 3.0	Uncertain
3.0 or above	Not likely

### **Recovery**

Historical 70% Corporate Loans, 45% for Bonds

**Volatility measure** is derived from the standard deviation of that expected default rate.

**Correlation measure** is a ratio of this standard deviation with and without the correlation coefficient factored in.

**RAROC** (Return Adjusted Risk of Capital):

**Economic Capital:**