



Handout for Unit 4
for
Applied Corporate Finance



Unit 4

Capital Structure



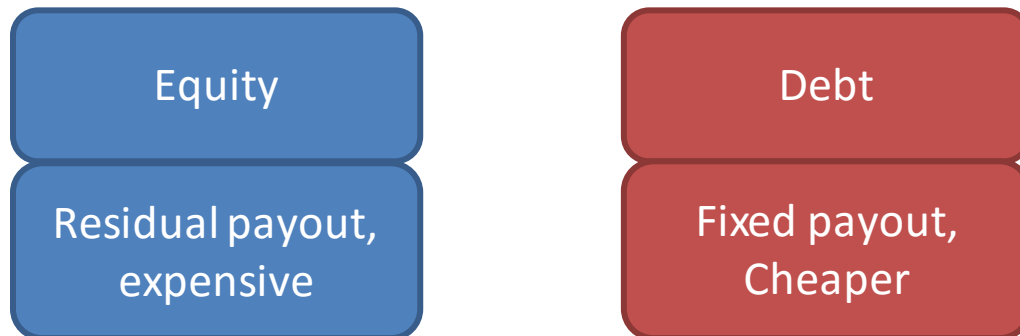
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Types of Financing

A firm can either raise Money using Equity, or using Debt. While Equity is expensive, and is the residual payout, after paying the lenders, debt is cheaper, and is a fixed payout.



We can find about the debt and equity levels from the balance sheet of a company. For example, in the image below, we can find out what is the debt and equity level for Apollo Tyres.

	Notes	As at March 31, 2016	₹ Million As at March 31, 2015
A. EQUITY & LIABILITIES:			
1 Shareholders' Funds :			
(a) Share Capital	B 1	509.02	509.09
(b) Reserves and Surplus	B 2	61,313.07	49,913.88
		61,822.09	50,422.97
2 Non-Current Liabilities:			
(a) Long-term Borrowings	B 3	6,095.73	3,339.39
(b) Deferred Tax Liabilities (Net)	C 13	5,961.75	5,208.95
(c) Other Long Term Liabilities	B 3	681.31	72.68
(d) Long-term Provisions	B 3	1,337.16	1,257.82
		14,075.95	9,878.84
3 Current Liabilities:			
(a) Short-term Borrowings	B 4	7,400.93	4,666.36
(b) Dues to Micro Enterprises & Small Enterprises		36.98	31.02
(c) Other Trade Payables		15,457.80	8,902.66
(d) Other Current Liabilities		5,558.94	6,927.14
(e) Short-term Provisions		6,693.10	5,465.75
		35,147.75	25,992.93
TOTAL		111,045.79	86,294.74

Debt in the above figure is the long and short term borrowing, while equity values can be found by adding Share Capital and Reserves and Surplus.



Financing Choices

Financing choices of the firm change based on its maturity, and business. Usually, smaller firms use own capital, while large public firms use debt.

Stage of Firm	Typical Financing Choice
Initial – Startup Phase	Internal Financing – Own Capital
Rapid Expansion	Venture Capital, Common Stock
High Growth	Common Stock, Convertibles
Mature Growth	Debt
Declining Growth	Repay sources of Funding

How to measure the Debt Financing for a firm?

We typically use the debt to capital ratio, given by

$$\frac{Debt}{(Debt + Equity)}$$

Debt includes all long term and short Term Debt.

Equity could be book value or market value, but needs to be used consistently across the spectrum of firms being analysed.

How much debt is good?

Assume a firm can borrow money at 8%, and its cost of equity is 12%.

- Should it raise any capital as debt, or have 100% Equity?
- If the answer to the first question on debt is Yes, then how much should a firm raise as debt? How much is too much?
- Are there any benefits of using debt?
- Are there any costs attached to this?

Our next discussion is going to try and answer these questions. However, there are some firms who do not have any debt. For example – Infosys, Eicher Motors. Take a look at the Infosys Balance Sheet. They have zero debt. This is not necessarily the best capital structure, since Infosys is taking money from Equity holders at nearly 11-13%, and keeping it in cash and bank balances. This is debatable from the shareholders' perspective



Consolidated Balance Sheet

Particulars	Note	in ₹ crore	
		As at March 31, 2016	2015
EQUITY AND LIABILITIES			
SHAREHOLDERS' FUNDS			
Share capital	2.1	1,144	572
Reserves and surplus	2.2	56,682	50,164
		57,826	50,736
Minority interests		-	-
NON-CURRENT LIABILITIES			
Deferred tax liabilities (net)	2.3	-	-
Other long-term liabilities	2.4	126	50
		126	50
CURRENT LIABILITIES			
Trade payables			
Total outstanding dues of micro enterprises and small enterprises	2.31	-	-
Total outstanding dues of creditors other than micro enterprises and small enterprises		386	140
Other current liabilities	2.5	7,601	6,920
Short-term provisions	2.6	9,202	8,443
		17,189	15,503
		75,141	66,289
ASSETS			
NON-CURRENT ASSETS			
Fixed assets			
Tangible assets	2.7	8,637	7,685
Intangible assets	2.7	4,543	3,661
Capital work-in-progress		960	776
		14,140	12,122
Non-current investments	2.9	1,817	1,398
Deferred tax assets (net)	2.3	533	536
Long-term loans and advances	2.10	6,832	4,906
Other non-current assets	2.11	66	85
		23,388	19,047
CURRENT ASSETS			
Current investments	2.9	75	872
Trade receivables	2.12	11,330	9,713
Cash and cash equivalents	2.13	32,697	30,367
Short-term loans and advances	2.14	7,651	6,290
		51,753	47,242
		75,141	66,289
SIGNIFICANT ACCOUNTING POLICIES	1		



Debt Benefits and Costs

Borrowing money from lenders sometimes adds some benefits to the firm. The key benefits of borrowing for a firm are

Lower Costs

- Cost of Debt is lesser than cost of Equity. So technically, debt is a cheaper source of funding. This is because debt holders have a priority in getting the payments, so they are happier with smaller returns.

Tax Benefits

- The interest that a firm pays on debt, reduces the pre tax profits. This interest thus is tax deductible, and gives a form of tax shield to the firm. When the firm uses equity, it is not allowed to deduct payments to equity (such as dividends) to arrive at taxable income. Those payments happen after the tax is paid.
- **Therefore, all other things being equal, higher the marginal tax rate in the business, higher the chances of the firm having more debt.**

Added Discipline

- Debt requires fixed payments, and inability to make those payments may lead to the closure of the business. Therefore, the firms that take debt, usually seem managements more proactive, and less complacent.



On the other hand, the key Costs related to debt are

Bankruptcy Costs

- If a firm is not able to repay its debt, this would result in different forms of costs that could come up. The first point to note is the probability of bankruptcy, which may be different for different industries. In addition, there are direct and indirect costs of bankruptcy. Direct costs are legal costs and filing costs. Indirect costs are the losses arising because the markets perceive the firm to be in trouble.
- **Firms with more volatile earnings and cash flows will face bigger chances of bankruptcy. The probability of bankruptcy should be a function of the predictability (or variability) of earnings.**
- Similarly, for some industries, indirect costs or loss of business or issues arising from chances of bankruptcy could be higher. Examples would be industries which require repeat customer interaction – for example auto industry. Another example would be the retail industry, where suppliers may ask for faster payments since the firm is only selling a third party product, nothing of their own is being sold.
- **Firms with more indirect costs arising out of bankruptcy would possibly have lesser room to take a lot of debt.**

Agency Costs

- An agency cost comes into picture when the person who is hired to do the work (agency) has different motivations than the person who is hiring (Principal). When a business borrows money, the stockholders use that money in the course of running that business. Stockholders interests are different from lenders' interests, because lenders are interested in getting their money back, while stockholders are interested in maximizing their wealth. Firms may pay large dividends or take riskier project – such that the bond holder interest is put at stake.

Loss of Future Borrowing Capacity

- When a firm borrows more today, it loses capacity to borrow in the future. This may be considered detrimental, in case a good project comes up later.
- **Therefore, firms that are uncertain about future projects and financing needs would keep lower leverage levels today.**



Approaches to Optimal Capital Structure

So what is the optimal capital structure? There are 4 approaches which can be used by a firm to arrive at the optimal capital structure.

Cost of Capital Approach

- The D/E ratio that minimizes the cost of capital

The Operating Income Approach

- The D/E ratio that minimizes the cost of capital and maximizes the operating income

The adjusted Present Value approach

- Optimal Debt Ratio maximizes the overall value of the firm

The Sector Approach

- The optimal debt ratio reaches close to sector averages

Let us now understand each approach in detail.

The Cost of Capital Approach

We already know how to calculate the cost of capital for a firm. The idea is to find the level of D/E which minimizes this cost of Capital.

$$WACC = \frac{E}{V} * Re + \frac{D}{V} * Rd * (1 - Tc)$$

But would that not be 100% debt?

It is not 100% debt, since the equation is dynamic. Both Cost of Equity and Cost of Debt will change as we get more debt in the firm. Cost of Equity will increase since the levered beta of the firm will increase, and with more debt, the credit rating of the firm would fall, and hence cost of debt will increase too.

Let us calculate this for Apollo Tyres. To be able to find this, we need to find the debt equity ratio that minimizes the Cost of Capital. For that we need the following

- Risk Free Rate
- Equity Risk Premium
- Current Debt Equity Ratio of Apollo Tyres
- Beta for Apollo Tyres



- Debt Rating Schedule (how ratings change with debt to capital ratio)

Assuming that the beta is 1.04, we calculate the unlevered beta, and then use the below table for the rating vs capital structure to arrive at the lowest cost of capital.

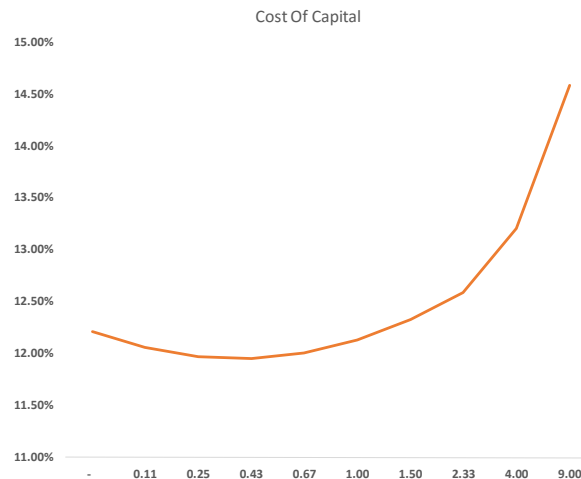
Government Bond Yield	7%
Risk Free Rate	5%
ERP	8%
Tax Rate	30%
Current D/E	0.24
Unlevered Beta	0.90

Debt to Capital is	Rating is	Spread is	Cost Of Debt
0	AAA	0.50%	7.50%
0.1	AA	1.00%	8.00%
0.2	A	1.50%	8.50%
0.3	BBB	2.00%	9.00%
0.4	BB	2.50%	9.50%
0.5	B	3.00%	10.00%
0.6	CCC	3.50%	10.50%
0.7	CC	4.00%	11.00%
0.8	C	5.00%	12.00%
0.9	D	7.00%	14.00%
1	D	7.00%	14.00%

D/E	Levered Beta	Cost of Equity
-	0.90	12.2%
0.11	0.97	12.8%
0.25	1.06	13.5%
0.43	1.17	14.4%
0.67	1.32	15.6%
1.00	1.53	17.3%
1.50	1.85	19.8%
2.33	2.37	24.0%
4.00	3.42	32.4%
9.00	6.58	57.6%
Infinite		

Cost Of Capital
12.21%
12.05%
11.97%
11.95%
12.00%
12.13%
12.32%
12.59%
13.20%
14.58%

We realize that the cost of capital first goes down as we increase the debt, and then after reaching an optimal level, starts rising again as cost of equity and debt both begin rising with higher debt levels.



The result is the given U-shaped cost of capital curve. Thus, the ideal Debt Equity ratio for Apollo tyres is given as 0.43.



The Operating Income Approach

As a company borrows money, there are chances that the indirect costs of bankruptcy cause the operating income to fall. Rather than looking at a single number for operating income, and assuming the firm value to be constant, we will now evaluate if the firm value itself changes due to changes in operating income (EBIT). We will now look to find the level where the firm value is highest, since at other levels the operating income may drop

Let us assume the following levels of drop in EBITDA with the rating changes for the firm

Rating is	Fall in EBIT
AAA	0%
AA	0%
A	0%
BBB	5%
BB	8%
B	10%
CCC	13%
CC	15%
C	18%
D	20%

Let us evaluate the changes to the value of the company here. For that, we will firm need the EBIT levels for Apollo Tyres, and then need to arrive at the Free Cash Flow Levels.

Current EBIT is Rs 16621 million. We will also assume that the firm is in steady state, and hence the depreciation is the same as the capex. We also assume no changes in working capital.

Terminal growth rate is assumed to be 4%. We find the below changes to operating income.

Debt to Capital is	Rating is	Spread is	Cost Of Debt	D/E	Levered Beta	Cost of Equity	Cost Of Capital	FCFF	Fall in EBIT	Value of the Firm
0	AAA	0.50%	7.50%	-	0.90	12.2%	12.21%	11,635		147,383
0.1	AA	1.00%	8.00%	0.11	0.97	12.8%	12.05%	11,635	0%	150,243
0.2	A	1.50%	8.50%	0.25	1.06	13.5%	11.97%	11,635	0%	151,870
0.3	BBB	2.00%	9.00%	0.43	1.17	14.4%	11.95%	11,053	5%	144,573
0.4	BB	2.50%	9.50%	0.67	1.32	15.6%	12.00%	10,762	8%	139,824
0.5	B	3.00%	10.00%	1.00	1.53	17.3%	12.13%	10,471	10%	133,974
0.6	CCC	3.50%	10.50%	1.50	1.85	19.8%	12.32%	10,180	13%	127,221
0.7	CC	4.00%	11.00%	2.33	2.37	24.0%	12.59%	9,889	15%	119,791
0.8	C	5.00%	12.00%	4.00	3.42	32.4%	13.20%	9,599	18%	108,511
0.9	D	7.00%	14.00%	9.00	6.58	57.6%	14.58%	9,308	20%	91,466

We realize that the highest firm value is at a debt equity of 0.25. Post that the income drop results in the firm value dropping, even though the Cost of Capital is lower elsewhere.



The Adjusted Present Value Approach

In the adjusted present value approach, the value of the firm is the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value.

$$\text{Firm Value} = \text{Unlevered Firm Value} + (\text{Tax Benefits of Debt} - \text{Expected Bankruptcy Cost from the Debt})$$

The optimal debt level is the one that maximizes firm value.

To solve this, we need to first find the unlevered value of the firm. This can be found by either valuing the firm using a cost of equity calculated with unlevered beta, or by removing the tax benefits and making the adjustments for bankruptcy costs in the current market value.

At every debt level, we need to calculate the value of the tax benefits due to debt.

Similarly, we need to calculate the expected bankruptcy cost, and the probability of bankruptcy at every debt level.

While it is difficult to find a probability of default for any firm, some studies have established the approximate chances of a firm defaulting given its rating. One such study is known as the Altman study of bonds. The table on the right estimates the default probabilities based on the bond rating of a firm. Altman estimated these probabilities by looking at bonds in each ratings class ten years prior and then examining the proportion of these bonds that defaulted over the ten years.

Rating	Likelihood of Default
AAA	0.07%
AA	0.51%
A+	0.60%
A	0.66%
A-	2.50%
BBB	7.54%
BB	16.63%
B+	25.00%
B	36.80%
B-	45.00%
CCC	59.01%
CC	70.00%
C	85.00%
D	100.00%

$$\text{Current Enterprise Value of the firm} = 109,610 + 14,577 - 7,158 = 117,029$$

$$\text{Tax Benefit of current Debt} = 14,577 * 30\% = 4,373$$

$$\text{Probability of Default at current debt levels} = 0.51\%$$

Assume Cost of Bankruptcy at 25% of current firm value

$$\text{Expected cost of Bankruptcy} = 0.51\% * 25\% * 117,029 = 149$$

$$\text{Unlevered Value of the firm} = 117,029 - 4,373 + 149 = 112,805$$



At every debt level, we need to calculate the value of the tax benefits due to debt.

Similarly, we need to calculate the expected bankruptcy cost, and the probability of bankruptcy at every debt level.

Debt to Capital is	Rating is	Default Probability	Total Debt	Tax Benefit of the Debt	Expected Cost of Default	Unlevered Firm Value	Levered Firm Value
0	AAA	0.07%	-	-	20	112,805	112,785
0.1	AA	0.51%	11,703	3,511	149	112,805	116,167
0.2	A	0.66%	23,406	7,022	193	112,805	119,634
0.3	BBB	7.54%	35,109	10,533	2,206	112,805	121,132
0.4	BB	16.63%	46,812	14,043	4,865	112,805	121,983
0.5	B	36.80%	58,515	17,554	10,767	112,805	119,593
0.6	CCC	59.01%	70,217	21,065	17,265	112,805	116,606
0.7	CC	70.00%	81,920	24,576	20,480	112,805	116,901
0.8	C	85.00%	93,623	28,087	24,869	112,805	116,023
0.9	D	100.00%	105,326	31,598	29,257	112,805	115,146
1	D	100.00%	117,029	35,109	29,257	112,805	118,657

The above table shows us the calculations, and shows that the optimal debt to capital ratio is 0.4.

The Sector Approach

Here we believe that the optimal debt/equity ratio is one where the sector average is met. Looking at peers such as MRF and Ceat, we see that the average debt / equity ratio should be about 14.2% for Apollo Tyres.

	Market Cap	Debt	D/E
MRF Tyres	173,510	23,700	13.7%
CEAT	42,700	6,284	14.7%
Sector Average			14.2%



Does Equity Value Change when we reach Optimal Capital Structure?

Now that we have looked at the variety of methods about finding the optimal capital structure of the firm, our endeavor should be to see if this enhances shareholder value.

Let us assume we will follow our first approach of Capital Structure optimization – the cost of capital approach. We will repeat our analysis using the market value of equity now, and then check what the firm needs to do.

The current capital structure includes debt of Rs 14,577 million, and equity (market value) of Rs 109,610 million. Our analysis shows that optimal debt to equity ratio is 0.43, and hence the new debt should be Rs 37,256 million.

Thus the firm needs to borrow an additional Rs 22,679 million, and then buy back shares with this money, or return this as dividend to shareholders.

Enterprise Value before the change = INR 117,029 million

Cost of Financing at Current Debt Values = 12.51%

Cost of Financing at New Debt Values = 12.38%

Saving = 0.13% * 117029

= 153 million

$$\text{Increase in Value} = \frac{\text{Savings Next Year}}{\text{Cost of Capital} - \text{growth rate}}$$

$$\text{Increase in Value} = \frac{153}{12.38\% - 4\%}$$

This is equal to Rs 1825 million. The new enhanced enterprise value should thus be = Rs 118,854 million

We can divide this increase by number of shares outstanding, to get a sense of increase in per share value.

Number of shares outstanding is 509.08 million, and each shares trades at Rs 215. The increase in share value would be thus

Rs 1825 million / 509.08 = Rs 3.58 per share increase.

What happens in a Buyback?

Assume that the extra debt is used to buyback shares. The firm has to raise an extra INR 22,679 million, and this can be used for a buyback. Let us assume a buyback at the price of Rs 215.

Number of shares that can be bought back = 22,679 / 215 = 105.33 million.



Net shares after the buyback = $509.08 - 105.33 = 403.74$ million

Equity value after buyback = Optimal Enterprise value + Cash – Debt

Equity value after buyback = $118854 + 7158 - 37256$

Equity value after buyback = 88756

Per Share Value = $88756 / 403.74$

= Rs 219.83

Determinants of Capital Structure

There are 4 major determinants of the capital structure

The Tax Rate

- Higher the tax rate, higher the debt firms will raise, since the benefit of taxes will be higher

The Cash Flows

- Higher the cash flows, and more stable they are, easier it is for the firm to borrow more

The Operating Risk

- Firms with higher operating leverage (high fixed cost) will see bigger earnings volatility, and hence will have lower borrowing capacity

Risk Premiums

- When risk premiums rise, firms will be able to borrow lesser



Case 4 – Unit 4

Capital Structure Evaluation

The analysis of optimal capital structure needs to happen for another firm. Pick up MRF tyres, and do the analysis of optimal capital structure. (Use the same data for risk free rate, equity premium, change of EBIT with debt and change of rating with debt as given earlier). You will need other data from the internet.

1. Calculate the current firm value, book value of equity, market capitalization, and cost of equity
2. Find the optimal capital structure - Using Cost of Capital Approach
3. Find the optimal capital structure - Using the Operating Income Approach
4. Find the optimal capital structure - Using the Adjusted Present Value Approach
5. Should the company do a buyback? If a company does a buyback using the increased proceeds of debt, what would be the impact on the share price?