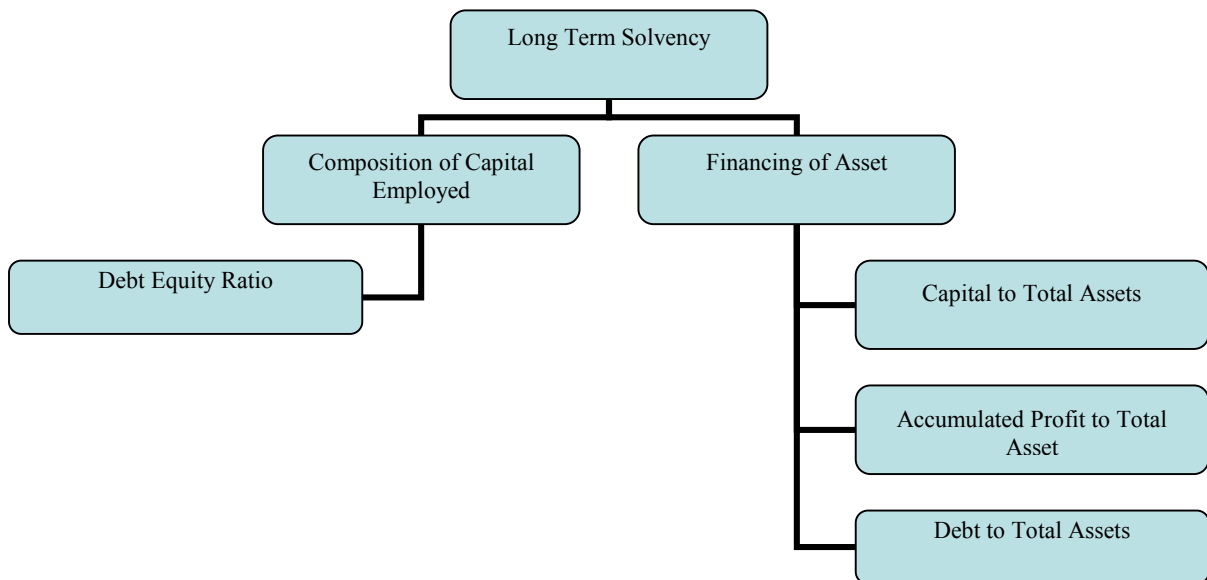


INTRODUCTION

Solvency refers to a company's ability to meet the long term liabilities. All activities of a company – financing, investing, and operating-affect the solvency position. One of the important components of the solvency analysis is the composition of capital structure. Solvency also depends on the operations. The ability to meet the long term obligations depends on the profit generating ability of the business.



Composition of Long Term Funds:

The long term funds of a company can be divided into three broad categories:

- Money contributed by the owners (Capital)
- Money generated by the business (accumulated profit)
- Money contributed by the outsiders on a long term basis (Long term debt)

Table 16.1 shows the capital employed or the long term funds of selected Indian companies.

	CE	% of Total Funds		CE	% of Total Funds
A C C Ltd.	3501.12	72%	Infosys Technologies Ltd.	6841	75%
National Aluminium Co. Ltd.	6533.6	87%	Wipro Ltd.	6418.62	70%
Maruti Udyog Ltd.	5696.8	75%	Ranbaxy Laboratories Ltd.	3457.86	74%
Mahindra & Mahindra Ltd.	3902.63	66%	Dr. Reddy'S Laboratories Ltd.	3194.62	83%

It can be seen from the above table that all eight companies from different industries are using the long term funds to finance their business.. In fact, more than 90% of the

companies forming a part of NIFTY are have used long term funds more than that the short term funds.

Debt Equity Ratio

Composition of long term funds can be studied by understanding the debt-equity ratio (DER). In this chapter we will have the DER as the main ratio and rest of the discussion will be around it. While understanding the DER, we will try to find answers to the following questions:

- How are the assets of the company funded: debt or equity?
- Does the company has the ability to meet the interest obligations?
- Does the company generate cash to make the necessary payments towards interest and principal component of the loan.

Characteristics of Debt and Equity:

Before we get into the details of DER, it will be useful to recapitulate the basic difference between debt and equity.

Debt	Equity
• Outsiders money	• Owners money
• Interest is compulsory	• Dividend is optional
• Interest is an expense	• Dividend is not an expense. It is distribution of profit
• Interest is an allowable expense while calculating the taxable income	• Dividend is not an allowable expense while calculating the taxable income
• Cost of debt (Kd) is lower than the cost of equity (Ke)	• cost of equity (Ke) is greater than the cost of debt (Kd)

Computation of Debt Equity Ratio

Generally debt equity ratio is calculated as the relationship between the long term debt and the shareholders funds:

$$\text{Debt Equity Ratio} = \text{Debt} / \text{Equity}$$

Where,

- Debt = Long Term Debt
- Equity = Share capital + Reserves & Surplus – Losses – Miscellaneous Expense

DER shows the composition of the capital employed.

Example 16.1

Table 16.2 shows some of the relevant financial items of ABC ltd.

Table 16.2	
Financial Items as on 1st April	
Current Assets	50,000
Investments	100,000
Plant	200000
Accumulated Depreciation	50,000
Current Ratio	2
Long term loans	200,000

Required : Debt equity ratio

Debt equity ratio requires information about debt and the owners fund. Debt is given in the table. We have to find owners fund. Let us prepare the balance sheet to find the owners fund. The balance sheet is shown in table 16.3

Table 16.3			
Balance Sheet			
Sources		Assets	
Owners fund	75,000	Fixed Assets	150,000
Long Term loans	200000	Investments	100,000
Current Liabilities	25000	Current Assets	50,000
	300,000		300,000

Workings

- Current ratio = 2
- Current assets = 50,000
- Current liabilities = Current Assets/Current Ratio = 25,000
- Owners fund
 - = Total Assets – Current Liabilities – Long Term Loans
 - = 300,000 – 25,000 - 200,000
 - = 75,000
- Debt equity ratio = Debt/Equity = 200,000/75.000 = 2.66

Example 16.2

Capital employed = 500,000; Annual interest = 30,000; Rate of interest = 10%. Find DER.

- Capital employed = Debt + Equity = 500,000
- Rate of interest on the debt = 10%
- Interest for the year = 30,000
- So, the debt = 300,000
- Now we can find equity = Capital employed – Debt = 200,000
- **Debt equity ratio = Debt/Equity = 3:2**

Table 16.4 shows the DER of some Indian companies:

Debt Equity Ratio as on 31st March 2006			
Tata Motors Ltd.	0.49	Hindustan Lever Ltd.	0.03
Ranbaxy Laboratories Ltd.	0.42	I T C Ltd.	0.01
Reliance Energy Ltd.	0.54	Maruti Udyog Ltd.	0.03
Reliance Industries Ltd.	0.41	Dabur India Ltd.	0.05

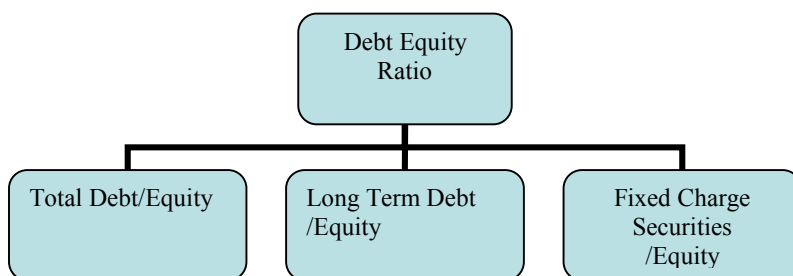
Interpretation of DER should be made after comparing it with the past DER and the DER of the other players belonging to the same industry. Table. 16.5 shows the DER of TCS which suddenly increased to 7.9 during the year 2004.

Change in DER of TCS Ltd. (Rs. In crores)					
	2006	2005	2004	2003	2002
DER	0.01	0.04	7.97	0.53	0.31
Debt	35.5	120.74	375	683.3	370.7
Equity	5,609.33	3,321.05	47.08	1,281.20	1,190.90

There is a need the reasons for high DER as on 31st March 2006. Is it because of more debt or less equity? One can see from the table that the debt gradually decreased over the years, however, during the year 2004, the reserves dipped by 95%.

Variations of DER:

There can be variations in computing DER. The composition of DER depends on the purpose for which one is determining DER.

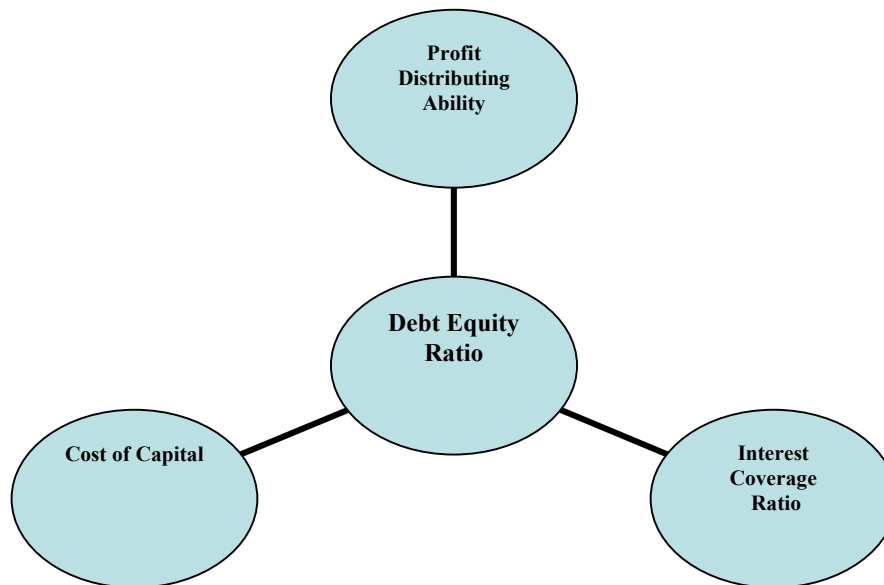


- Total Debt to Equity: This ratio will show the relationship between the outsiders money and the owners money. Outsiders money reflects the total debt and includes both long term liabilities and short term liabilities. Equity includes both capital (equity capital and preference capital) and reserves.
- Long Term Debt to Equity: This ratio is conventional DER.

- Fixed Charge Securities to Equity: Fixed charge securities include bonds, debentures, loans, and preference shares. The denominator consists of equity capital and reserves.

Relevance of DER

Debt equity ratio affects the cost of capital, earning per share and the interest coverage ratio.



DER and Profit Distributing Ability

Profit distributing ability of a company is reflected through the earning per share (EPS) or the return on equity (ROE) or return on net worth (RONW).

EPS and ROE shows the profit available for the share holders. Higher the EPS or ROE, higher is the profit distributing ability. Profit distributing ability of a company is affected by several factors, however, one of the important factors is DER.

Example 16.3

Let us take an example to understand the impact of DER on the EPS. ABC Ltd. has the capital employed of Rs. 100,000 composed of debt and equity in the ratio of 1:4. The return on capital employed of the company is 20%. The rate of interest on the debt is 10%. Table 16.6 shows the impact of increase in DER from 1:4 to 4:1.

Assumptions

- No change in the capital employed
- Debt-equity ratio changes from 1:4 to 4:1
- Return on capital employed = PBIT/Capital Employed
- Return on equity = PAT/Equity

Table 16.6				
Table 2 Impact of DER on EPS				
DER	0.25	0.70	1.50	4.00
10% Debt	20,000	40,000	60,000	80,000
Capital (Rs. 10)	80,000	60,000	40,000	20,000
Capital Employed	100,000	100,000	100,000	100,000
20% PBIT	20,000	20,000	20,000	20,000
Interest	2,000	4,000	6,000	8,000
PBT	18,000	16,000	14,000	12,000
Tax (40%)	7,200	6,400	5,600	4,800
PAT	10,800	9,600	8,400	7,200
ROE	14%	16%	21%	36%

One can see from the above table that the ROE increased from 14% to 36% when the DER increased from 0.25 to 4.0.

Let us change the rate of return on capital employed from 20% to 10% and the rate interest from 10% to 12%. Table 16.7 shows that the ROE decreases with the increase in the DER.

Table 16.7				
Table 3 Impact of DER on EPS				
DER	0.25	0.7	1.5	4
12% Debt	20000	40000	60000	80000
Equity (Rs. 10)	80000	60000	40000	20000
Capital Employed	100000	100000	100000	100000
10% PBIT	10000	10000	10000	10000
Interest	2400	4800	7200	9600
PBT	7600	5200	2800	400
Tax (40%)	3040	2080	1120	0
PAT	4560	3120	1680	400
ROE	6%	5%	4%	2%

This process of improving EPS by using more of debt is called *trading on equity*. However, trading on equity will not result in increase in EPS or Return on Equity (ROE).

Example 16.4

The capital employed of two companies A ltd and B ltd is 60,000. However, the capital structure of A consist of 12% debt of Rs. 50,000 whereas, there is no debt in the capital structure of B ltd. Show the impact of debt on ROE and EPS when the return on capital employed (ROCE) is 10% and 20%. Table 16.8 shows the impact of DER on PAT and

Table 16.8					
When ROCE < Rate of Interest			When ROCE > Rate of Interest		
	A ltd.	B ltd.		A ltd.	B ltd.
DER	5		DER	5	
12%Debt	50000	0	12%Debt	50000	0
Capital (10)	10000	60000	Capital (10)	10000	60000
	60000	60000		60000	60000
ROCE (10%)	6000	6000	ROCE (20%)	12000	12000
Interest	6000	0	Interest	6000	0
PBT	0	6000	PBT	6000	12000
Tax	0	2400	Tax	2400	4800
PAT	0	3600	PAT	3600	7200
ROCE	10%	10%	ROCE	20%	20%
ROE	0	6%	ROE	0	12%
EPS	0	0.60	EPS	0	1.20

Altd in the above case is a levered company: Company using debt. Whereas, B ltd. is an unlevered company: company not using debt at all. Above tables can be summarized as follows:

- a) In case of a levered company
 - If the Rate of Return (ROCE) is greater than the rate of interest, the Return on Equity (ROE) will be more than the Return on Capital Employed.
 - If the Rate of Return (ROCE) is less than the rate of interest, the Return on Equity (ROE) will be less than the Return on Capital Employed and will also be less than the ROE of a levered company
- b) In case of an un-levered company: if
 - If the Rate of Return (ROCE) is greater than the rate of interest, the Return on Equity (ROE) will be less than the Return on Capital Employed.
 - If the Rate of Return (ROCE) is less than the rate of interest, the Return on Equity (ROE) will be less than the Return on Capital Employed but will be greater than the ROE of a levered company.

Impact of leverage or DER on the profit distributing ability can also be studied by computing the **Financial Leverage Index (FLI)**. FLI can be calculated as follows:

- Financial Leverage Index = Return on Equity/ Return on Capital Employed

FLI greater than 1 indicates that the company will benefit by increasing the leverage. Following table summarizes the impact of DER on the profit distributing ability using the

financial leverage index (FLI). Table 16.9 is based on the information provided in the tables 16.6 and 16.7.

Table 16.9				
DER and Profit Distributing Ability				
DER	0.25	0.67	1.5	4
When ROCE > Rate of Interest				
RoE	14%	16%	21%	36%
FLI	0.68	0.8	1.05	1.8
When ROCE < Rate of Interest				
RoE	6%	5%	4%	2%
FLI	0.57	0.52	0.42	0.2

Example 16.5

A and B are two companies operating in the same industry but following different capital structure. Both have the same amount of capital employed of Rs. 3000. A finances its business with debt-equity ratio of 2:1 where as B is fully financed by equity. Examine the impact of the DER on the return on capital employed and return on equity under the following situations:

- Situation I: ROCE (20%) > Rate of interest (10%)
- Situation II: ROCE (10%) = Rate of interest (10%)
- Situation III: ROCE (8%) > Rate of interest (10%)

Table 16.10 shows the details of the returns under different situations

Table 16.10						
	ROCE > Interest Rate		ROCE = Interest Rate		ROCE < Rate of Interest	
	A	B	A	B	A	B
D	2000	0	2000	0	2000	0
E	1000	3000	1000	3000	1000	3000
PBIT	3000	3000	3000	3000	3000	3000
Int	600	600	300	300	240	240
PBT	200	0	200	0	200	0
Tax	400	600	100	300	40	240
PAT	160	240	40	120	16	96
ROE	240	360	60	180	24	144
ROCE	24%	12%	6%	6%	2.4%	4.8%
ROCE post tax	20%	20%	10%	10%	8%	8%
	12%	12%	6%	6%	4.8%	4.8%

Table 16.10 shows the following:

- An unlevered company (in this case B) the return on capital employed post tax is identical to its return on equity in all situations.
- A levered firm (in this case A) can earn more return on equity if the rate of interest is less than the return on capital employed.

- An unlevered firm (in this case B) can earn more return on equity if the rate of interest is more than the return on capital employed.

DER and Cost of capital

Cost of capital is the summation of the cost of debt and cost of equity. So the cost of capital depends on the following:

- Cost of Capital(K_e)
- Cost of Debt (K_d)
- Debt equity ratio (DER)

Example 16.6

Capital structure of AB ltd is as follows:

- 12% Loans = 200,000
- Capital = 400,000
- Tax Rate = 40%
- Risk free return (R_f)= 5%
- Market return (R_m)= 20%
- Beta (B) = 1.5

Find weighted average cost of capital if the

Computation of cost of capital

- Cost of debt = K_d = Post tax interest rate = $0.6 * 12\% = 7.2\%$
- Cost of Equity = $R_f + B * (R_m - R_f) = 5\% + 1.5 * (20\% - 5\%) = 27.5\%$
- DER = 1: 2

- $WaCC = K_d * D/D+E + (K_e * E/D+E)$
- $WaCC = 14.6\%$

Following table shows the impact of DER on WaCC:

Table 16.11				
DER and WaCC				
K_d	7.20%	7.2%	7.2%	7.2%
K_e	18.3%	18.3%	18.3%	18.3%
D	1	2	4	6
E	2	2	2	2
DER	0.5	1	2	3
WaCC	14.60%	12.75%	10.90%	9.98%

Assumptions

- K_d remains constant
- K_e remains constant
- Only DER changes

However one has to keep in mind that when a company uses more and more debt the creditworthiness of the company reduces and the credit rating falls. It may lead to higher rate of interest. Table 16.12 shows the impact of DER on the WaCC if the Kd increase with the increase in the DER.

DER and WaCC				
Kd	7.20%	10.0%	12.0%	15.0%
Ke	18.3%	18.3%	18.3%	18.3%
D	1	2	4	6
E	2	2	2	2
	3	4	6	8
DER	0.5	1	2	3
WaCC	14.60%	14.15%	14.10%	15.83%

DER and Interest Coverage Ratio

Interest coverage ratio shows the ability of a company to cover the interest on borrowing. In other words, it shows whether the profits of the company are sufficiently covering the interest. Interest coverage ratio is calculated as follows:

$$ICR = \text{Profit before Interest and Taxes (PBIT)} / \text{Interest}$$

It shows how many times the profit covers the interest. ICR less than 1 indicates that the company is not generating sufficient profits (before interest) to meet its expenses. In other words, the company is actually making losses. Other things remaining constant interest coverage ratio and DER are inversely related.

Table 16.13 shows interest coverage ratio of two well known steel companies of India.

Interest Coverage Ratio					
	2006/03	2005/03	2004/03	2003/03	2002/
Interest Cover	36.46	26.72	15.98	6.23	2.83
Debt/Equity	0.25	0.38	0.74	1.33	1.37
Tisco PBIT (in crores)	5,366.07	5,493.79	3,058.92	#####	614.65
Interest Cover	15.92	18.45	5.1	1.73	0.3
Debt/Equity	0.34	0.55	1.72	5.14	4.95
SAIL PBIT (in crores)	6,058.33	9,854.08	3,429.00	912.09	-805.77

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In both cases, ICR has increased due to following reasons:

- Decrease in DER: Both companies reduced DER by repaying off debt. In the case of Tisco, debt reduced from 4700 crores to 2500 crores. Similarly, debt reduced from 14,00 crores to 4200 crores during this period.
- Increase in PBIT : During this period, the business conditions of the steel industry improved and these companies undertook several measures to improve

productivity. Good market conditions and improved productivity resulted in increase in the PBIT.

Example 16.7

ABC Ltd had capital employed of Rs. 50,000 with debt of 10,000 and equity of 40,000. Rate of interest is 10% and the rate of return on the capital employed is 40%. Examine the impact on the interest coverage ratio if the company changes the DER without making any change in the capital employed.

- Interest coverage ratio (ICR) = PBIT/Interest
- PBIT = 40% of Capital employed = 20,000
- Interest = 20% of Debt = 1000
- ICR = 20,000/1000 = 20

Table 16.14 shows ICR when the DER is changed.

Table 16.14				
Impact of DER on ICR				
DER	0.25	0.70	1.50	4.00
10% Debt	10,000	20,000	30,000	40,000
Capital (Rs. 10)	40,000	30,000	20,000	10,000
Capital Employed	50,000	50,000	50,000	50,000
40% PBIT	20,000	20,000	20,000	20,000
Interest	1,000	2,000	3,000	4,000
ICR	20.0	10.0	6.7	5.0

Debt Service Coverage Ratio (DSCR)

Interest coverage ratio shows only the interest component. However, when a company takes a loan it may have to repay the loan on regular basis. Such payment is may be called equal annual installments (EAI). Such regular payments consist of interest and a component of principal. DSCR shows the funds available from the operations to meet annual interest and principal. It is calculated as follows:

$$DSCR = \frac{PAT + Depreciation + Interest + Amortisation}{Interest + Principal Component}$$

Or

$$DSCR = \frac{PBDITA - Tax}{Interest + Principal Component}$$

Depreciation and amortization are added to the profit to get the cash profit.