

## INTRODUCTION

Every stakeholder has interest in understanding the profitability of a company. Analysis of profitability requires one understand the following:

- Meaning of profit
- Meaning of revenue
- Composition of expenses
- Composition of investment

### Meaning of Profit

Profit is generally defined as excess of income or revenue over the expenses. Profit is always determined for a particular period. Such period is called accounting period or reporting period. So profit is calculated for a year or for a quarter. Profit calculation is always based on the Generally Accepted Accounting Principles (GAPP) assumptions. Some of the important assumptions are as follows:

- Accrual: Transactions should be recorded independent of actual payment or receipts.
- Matching: Profit should be determined by deducting the corresponding expenses. Expenses should be charged for the period of the benefit.

In most of the cases, profit can be managed (changed) by using the above assumptions as shown by table 17.1.

Profit Management using the Matching Principle			
	Case 1	Case 2	Case 3
Profit before Amortisation	100,000	100,000	100,000
Amortisation of Advertisement Expenses	5,000	10,000	25,000
Profit after Amortisation	95,000	90,000	75,000
Un amortised expenses	45,000	40,000	25,000

Profit, in the above case has changed due to the change in the amortisation period. Advertisement expenses of Rs. 50,000 has been amortised over ten years in the first case whereas, in the case 3, it has been amortised over a period of two years. So one has to keep in mind the impact of the accounting assumptions while undertaking the analysis of the profit.

### Variations of Profit

Profit has different meaning to different stakeholders. Some stakeholders have interest in the profit generating ability. Others may have interest in the profit distributing ability. Profit can be classified into three broad categories

- Accounting Profit
- Cash Profit
- Economic Profit

### Accounting Profit

Accounting profit is the profit shown by the financial statements prepared on the basis of the GAAP. It is the information provided by the management to the shareholders on a regular basis. Financial statements are supposed to show the true and fair profit to the shareholders. However, nowhere, 'true and fair' view has been defined properly. One can get to see the profit of a company in the Income statement (profit and loss account) and/or the balance sheet. Income statement shows the profit for the current period and the balance sheet shows the accumulated profit. Some of the important assumptions while computing profit are as follows:

- Accrual principle: expenses and income should be shown in the income statement at the time of the transaction independent of the actual payment and actual receipt.
- Matching principle: Revenue should be compared with the corresponding expenses only.
- Conservative principle: Provisions can be created to meet future expenses or losses.
- Financial assumptions: Borrowings (loans/debt) has cost. Equity has no cost. In other words, interest is treated as an expense. Whereas dividend is not treated as an expense. Interest is an expense, whereas, dividend is an appropriation of profit.

In the income statement one can see following profits:

- Gross Profit = Total Income- Cost of Goods Sold (COGS)
- Profit Before Depreciation, Interest, Tax and Amortisation (PBDITA) = Gross Profit – Operating Expenses
- Profit Before Interest and Tax (PBIT) = PBDITA – Depreciation - Amortisation
- Profit Before Tax = PBDITA - Interest
- Profit After Tax = PBT – Tax
- 

Table 17.2 shows different profits of TVS motors.

	2001-02		2002-03		2003-04	
	Sales & Other Income	1944		2725		2856
Expenditure	1850	95%	2521	93%	2641	92%
PBIT	94	5%	204	7%	216	8%
Interest	12	1%	3	0%	1	0%
PBT	83	4%	201	7%	215	8%
Tax	29	1%	73	3%	76	3%
PAT	54	3%	128	5%	138	5%

Source: Annual Reports for the respective year

### Cash Profit

As mentioned in the previous section accounting profit is subjected to the accounting assumptions. Expenses in the income statement includes some non-cash items. Depreciation and amortisation are some of non-cash items. It is possible to change the profit by changing these non-cash items. These non-cash items can be changed by changing the accounting assumptions. Cash profit is determined by keeping aside these assumptions.

Cash profit = PAT + Depreciation + Amortisation

### Profit and Business Decisions

It is necessary to check whether the profit is changing due to the operating decisions, investment decisions or financing decisions.

Table 1.3 shows that in some cases depreciation may account for huge difference in the profits. Such high depreciation may be due to high investments in the depreciable assets or some time it may be due to the accounting assumptions.

Impact of Investment Decision (Depreciation) on Profit ( for the year ending March 2006)			Rs. In crores
Company Name	PBDIT	PBIT	PBIT % of PBDIT
Bharat Petroleum Corpn. Ltd.	1447.84	679.83	47%
Hindustan Petroleum Corpn. Ltd.	1354.86	665.89	49%
Tata Consultancy Services Ltd.	3422.21	3164.83	92%
Satyam Computer Services Ltd.	1640.15	1517.34	93%

Source: Calculated from the respective annual reports

Sometimes the financing decision may affect the profits. If a company finances its business with debt, it may affect the profit distributing ability reflected in the form of PAT. Table 17.4 shows PAT and PBIT of some well known companies of India.

Impact of Financing Decision(interest) on Profit ( for the year ending March 2006)			Rs. In crores
Company Name	PBIT	PAT	PAT as % of PBIT
Jet Airways (India) Ltd.	1,430	452	32%
Oil & Natural Gas Corpn. Ltd.	25,463	14,431	57%
Tata Consultancy Services Ltd.	3,165	2,717	86%
Infosys Technologies Ltd.	2,781	2,421	87%
H C L Technologies Ltd.	350	329	94%

Source: Calculated from the respective annual reports

### Analysis of Profit

Profit is the excess of income over expenses. Expenses is the summation of cost of goods sold (COGS), operating expenses, depreciation, and interest.

Some of the important items which, which affect profit, are as follows:

- Revenue
- Cost of Goods Sold
- Depreciation
- Amortisation
- Interest
- Tax

## Revenue

Accounting Standard (AS-9) governs the recognition of revenue in the financial statements. For the details of AS refer to chapter – Revenue is recognized as follows:

Revenue can change due to the quantity, price, or segment composition. See the table 17.5 to get an understanding of the relevance of segment level analysis.

Hindalco (Rs. In crores)			
Segment Profitability for the year 2006			
	Aluminium	Copper	Total
Total Revenue	6042	5354	11,397
	53%	47%	
Assets	7134	6731	13,865
	51%	49%	
Profit	2128	19	2,147
	99%	1%	

Source: Annual Report: <http://www.hindalco.com>

Copper contributes 47% of the total revenue and has equally high percentage of investment. However, copper contributes only 1% of the total profit.

## Cost of Goods Sold

Measuring cost of goods sold (COGS) will also have impact on the profit. COGS depends on the methods of valuing inventory. One can change COGS by changing the methods of inventory valuation. For details on inventory valuation see chapter 12

### Example 17.1

On 1<sup>st</sup> April 2006 ABC Ltd had 5000 units of goods costing Rs. 5 per unit. During the first quarter purchased 10,000 units @ 10. The company sold 12,000 units @ 20. Find cost of goods using LIFO, Simple average, and FIFO method of inventory valuation.

Value of COGS under different methods of inventory valuation is shown in table 17.6.

Profit and Inventory Valuation				
		LIFO	Average	FIFO
Opening Stock	5000	25,000	25,000	25,000
Purchase	10,000	100,000	100,000	100,000
<b>COGS</b>	<b>12000</b>	<b>110,000</b>	<b>90,000</b>	<b>95,000</b>
Closing Stock	3,000	15,000	35,000	30,000

Workings:

- COGS under LIFO =  $(10,000 \times 10) + (2,000 \times 5) = 110,000$
- COGS under Average =  $12,000 \times 7.5 = 90,000$
- COGS under FIFO =  $(10,000 \times 10) + (2,000 \times 5) = 110,000$

Change in profit as shown by table 17.7 is only due to the change in the methods of valuing inventory. Cost of goods purchased is apportioned between COGS (expense) and the value of closing stock(asset).

Table 17.7				
Profit and Inventory Valuation				
		LIFO	Average	FIFO
Sales	12,000	240,000	240,000	240,000
Less COGS	12,000	110,000	90,000	95,000
Profit		130,000	150,000	145,000

### Depreciation

Depreciation is another item that will influence the profits. Profit can be managed by changing depreciation. Selection of depreciation method is a managerial choice. Managers may use depreciation to increase or decrease profit of a particular reporting period. For details on depreciation see chapter 11.

#### Example 17.2

Sales of ABC Ltd = 100,000; COGS = 30,000; Cost of Plant = 100,000; find profit using different methods of depreciation.

- Straight line method = 10%
- Reducing balance method = 25%
- Double declining method = 20%

Table 17.8 shows the profit under different methods of depreciation.

Table 17.8			
Depreciation			
	SLM	RBM	DDM
Cost of the asset	100,000	100,000	100,000
Rate	10%	25%	20%
Depreciation	10,000	25,000	20,000
Depreciation and Profit			
Sales	100,000	100,000	100,000
COGS	30,000	30,000	30,000
PBDIT	70,000	70,000	70,000
Depreciation	10,000	25,000	20,000
PBIT	60,000	45,000	50,000

In this case also, change in profit is due to the change in depreciation rather than the change in the operating efficiency.

### Interest

A company can raise funds from shareholders (capital) or loan givers (debt). Accounting treats the cost of these funds differently. Interest on debt is treated as an expense, whereas, dividend is treated as an appropriation of profit. Moreover, interest is allowed as an expenses while computing the taxable profits. As a result a company has the opportunity to change the profit after tax (PAT) just by changing the capital structure.

#### Example 17.3

ABC Ltd expects to earn 20% profit (before interest and tax) on the total assets. Assets can be financed by 10% debt and capital (of Rs.10). Find impact of different ways of financing on the profit.

Suppose the company plans to invest Rs. 60,000 in the assets in the following ways:

- Case I: Debt ( 10,000) and Capital( 50,000)
- Case II: Debt ( 20,000) and Capital( 40,000)
- Case III: Debt ( 50,000) and Capital( 10,000)

Table 17.9 shows the impact of different combinations of debt and capital on the profit after tax.

Table 17.9				
Profit and Interest				
DER	0.2	0.5	5	
10% Debt	10000	20000	50000	
Capital ( RS. 10 per share)	50000	40000	10000	
Capital Employed	<b>60000</b>	<b>60000</b>	<b>60000</b>	
PBIT (20%)	12000	12000	12000	
Interest	1000	2000	5000	
PBT	11000	10000	7000	
PAT (tax 40%)	6600	6000	4200	
EPS	1.32	1.5	4.2	

Change in PBT, PAT, and EPS is solely due to the change in the capital structure and the differential treatment of interest.

### Profit Ratios

Income statement shows different profit. One can determine different profit ratios depending on the requirement of the analyst.

#### Gross Profit Ratio:

This is also called gross margin. Gross profit is the excess of sales over the cost of goods sold (COGS).

- $\text{Gross Profit Ratio} = \text{Gross Profit} / \text{Sales}$
- $\text{Gross Profit} = \text{Sales} - \text{Cost of Goods Sold}$
- Gross profit can also be calculated after deducting other direct expenses.

However, there is no consistency in presenting the gross profit. Moreover, gross profit has not defined any where. One has to keep in mind the possibility of arriving at different gross profit. Gross profit shows the basic profitability of a company. However, as mentioned in the previous section, COGS depends on the inventory valuation methods. Inventory valuation can, therefore, may distort the comparison solely based on the gross margin.

**Operating Profit Ratio:**

Operating Profit is the excess of gross profit over the operating expenses, depreciation, and amortisation.

- Operating Profit Ratio = Operating Profit /Sales
- Operating Profit = Gross Profit – Operating Expenses – Depreciation -Amortisation

In this case also, there is no consistency in determining the gross profit. Moreover, one has to keep in mind the possibility of arriving at different operating profit. This ratio shows the profit generating ability of the business from its core activities.

However, as mentioned in the previous section, many components of this ratio, viz, COGS, depreciation, and amortisation depend on the accounting assumptions.

If a company has a consistently decently gross margin with low or negative operating profit ratio, one has to investigate the operating expenses and other non-cash expenses: depreciation and amortisation.

**Return on Investment (ROI)**

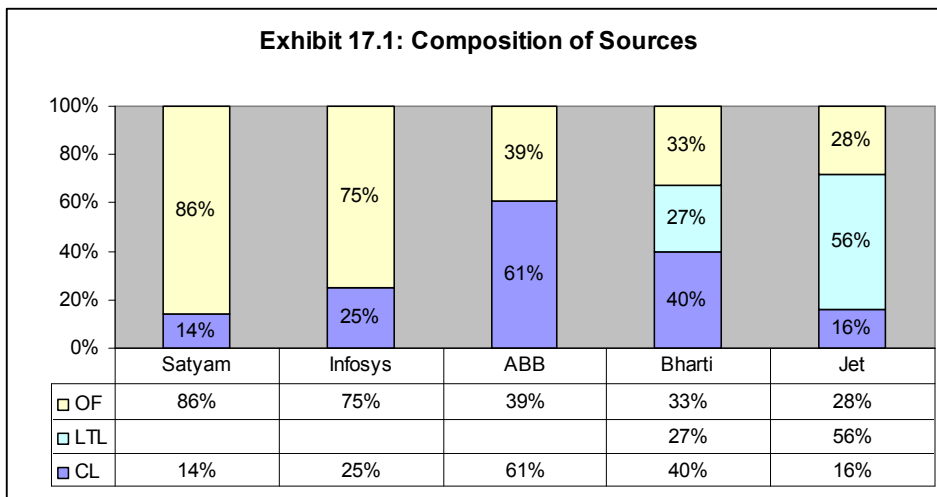
Return on investment helps in understanding the overall performance of a company. ROI is computed as follows:

ROI = Return / Investment

Before getting into the details of ROI let us define return and investment and understand different connotations of Return and Investment.

**Understanding Investment**

There is no single definition of investment. It depends on the purpose of the analysis. In its widest connotation, the term investment refer to total sources of funds. Similarly, in the narrow sense, it connotes the equity capital. Between these two extremes, there are different combinations. See the following exhibit:



The exhibit shows the different companies use different combination of sources of funds to finance its activities. So the term investment can be explained as follows:

**Investment as Total Sources**

Total sources is the summation of all sources. It shows the funds raised from all sources: shareholders, outsiders and the money generated from the business.

- Total Sources = Capital + Reserves + Borrowings (short term and long term)- Losses and Miscellaneous Expenses not written off
- Total Sources = Owners Funds + LTL + CL
- Total Sources = Total Assets

**Investment as Capital Employed**

Investment can also be seen as the long term sources only. In that case, investment means capital employed.

- Capital Employed = Owners Funds + Long Term Funds
- Capital Employed = Total Sources – Current Liabilities
- Capital Employed = Total Assets – Current Assets – Current Liabilities
- Capital Employed = Fixed Assets +Investment +Networking Capital

**Investment as Owners Fund**

Investment can also seen as the owners money. Owners money is money contributed by the owners (shareholders) and the money generated by the business after meeting all expenses including interest.

- Owners Fund = Capital + Reserves –Miscellaneous expenses not written off
- Owners Fund = Capital Employed –Long Term Borrowings
- Owners Fund = Total Sources – Long Term Borrowings – Current Liabilities
- Owners Fund = Total Assets – Liabilities

**Investment as Capital**

Investment can also as the money contributed by the owners (shareholders).

**Understanding Return**

Return in the simplest understanding is the profit. But, which profit? The answer depends on the purpose of ROI analysis.

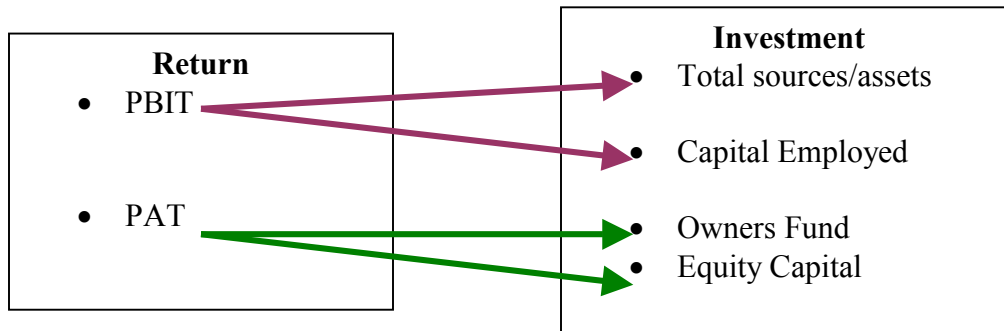
- Are we interested in analysing the profit available for all suppliers of money?
- Are we interested in analysing the profit available for the supplies of long term funds?
- Are we interested in analysing the profit available for the supplies of equity?

As mentioned at the beginning of the chapter, profit can be gross profit, profit before interest and tax (PBIT) and profit after tax (PAT).



**Calculating Return on Investment**

While calculating ROI, we establish a relationship between return and investment. As mentioned in the previous section, definition of return (numerator) depends on the definition of the investment (denominator).



*Example 17.4*

Refer to the table 17.10. Find different profits and different investments that can be used for determining the ROI.

Balance Sheet		Income Statement	
Fixed Assets	150,000	Sales	100,000
Current Assets	50,000	COGS	20,000
Investments	20,000	Operating Expenses	10,000
	<b>220,000</b>	Depreciation	5,000
Capital	60,000	Interest	2,000
Reserves	80,000	Amortisation	2,000
Long Term loans	50,000	Tax	10,000
Current Liabilities	30,000	Total Expense	49,000
	<b>220,000</b>	Profit	<b>51,000</b>

**Investment**

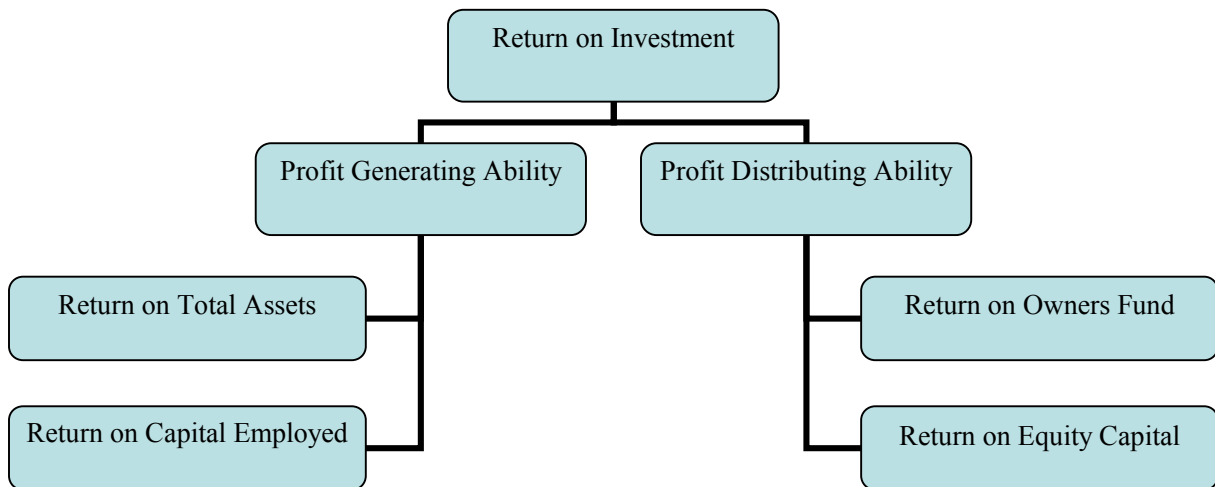
- Capital = 60,000
- Net-worth = Capital + Reserves = 60,000 + 80,000 = 140,000
- Capital Employed = Capital + Reserves + Long Term Loans = 140,000+50,000
- Total investment or Total Assets = Capital Employed + Current Liabilities = 220,000

**Return**

- Gross Profit = Sales –COGS = 80,000
- Profit before interest, depreciation, amortisation, and tax (PBDITA) = 70,000
- Profit before interest and tax (PBIT) = 63,000
- Profit before tax (PBT) = 61,000
- Profit after tax (PAT) = 51,000

While determining the ROI, one has to ask the following question:

- Are we interested in analysing the profit generating ability of the company?
- Are we interested in analysing the profit distributing ability of the company?



**Profit Generating Ability**

PGA shows the ability of the company to use the resources to generate income to meet the expenses and leave some return for the investors: loan givers and capital givers. PGA, therefore, shows the relationship between return and total assets or capital employed. Following ratios are useful indicators of profit generating ability a company:

- Return on Total Assets (ROTA)
- Return on Capital Employed (ROCE)

**Return on Total Assets (ROTA)**

It is the relationship between PBIT and total assets. ROTA is calculated as follows:

- $ROTA = \frac{PBIT}{Total\ Assets}$
- Where
  - $PBIT = Sales - COGS - Operating\ Expenses - Depreciation\ and\ Amortisation$
  - $Total\ Assets = Fixed\ Assets + Investments + Current\ Assets$

Table 17.11			
ROTA as on 31st March 2006			
	%		%
Tata Consultancy Services Ltd.	43%	Ranbaxy Laboratories Ltd.	5%
Hero Honda Motors Ltd.	38%	Zee Entertainment Enterprises Ltd.	5%
National Aluminium Co. Ltd.	33%	Mahanagar Telephone Nigam Ltd.	3%
Infosys Technologies Ltd.	31%	Hindustan Petroleum Corpn. Ltd.	3%
Satyam Computer Services Ltd.	30%	Bharat Petroleum Corpn. Ltd.	2%

Source: CMIE Database

*Example 17.5*

Table 17.12 shows the balance sheet and income statement of ABC Ltd. As on 1<sup>st</sup> April 2006. Find ROTA

Balance Sheet		Income Statement	
Fixed Assets	50,000	Sales	100,000
Current Assets	20,000	COGS	20,000
Investments	20,000	Operating Expenses	10,000
	<b>90,000</b>	Depreciation	5,000
Capital	10,000	Interest	2,000
Reserves	60,000	Total Expenses	37,000
Long Term loans	20,000	PBT	63,000
	<b>90,000</b>	PAT	<b>37,800</b>

To calculate ROTA we have to find the following:

- $PBIT = Sales - COGS - Operating Expenses - Depreciation = 65,000$
- Total Assets = 90,000
- $ROTA = PBIT / Total Assets = 65,000 / 90,000 = 72.2\%$

*Example 17.6*

Profit after tax = 12,000; Tax rate = 40%; Net-worth = 50,000; Working Capital = 20,000; Current Assets = 30,000; Interest = 2,000; Rate of interest = 10%. Find ROTA.

- $PBIT = PAT + Tax = 12,000 + 8,000 = 20,000$
- Total Assets = Net-worth + Current Liabilities + Long Term Loans
  - Net-worth = 50,000
  - Current Liabilities = Current Assets - Working Capital = 10,000
  - Long Term Loans = Interest / rate of interest = 20,000
- Total Assets = 50,000 + 10,000 + 20,000 = 80,000
- $ROTA = PBIT / TA = 20,000 / 80,000 = 25\%$

**Return on Capital Employed (ROCE)**

This ratio shows the money available for long term investors (equity and debt) and other statutory payments like tax. ROCE is calculated as follows:

- $ROCE = PBIT / Capital Employed$
- $PBIT = Sales - COGS - Operating Expenses - Depreciation and Amortisation$
- Capital Employed = Owners Fund + Long Term Loans
- Capital Employed = Total Assets - Current Liabilities

*Example 17.7*

Table 17.13 shows the balance sheet and income statement of ABC Ltd. As on 1<sup>st</sup> April 2006. Find ROCE

Balance Sheet		Income Statement	
Fixed Assets	100,000	Sales	100,000
Current Assets	50,000	COGS	20,000
Investments	20,000	Operating Expenses	10,000
	<b>170,000</b>	Depreciation	5,000
Capital	20,000	Interest	2,000
Reserves	80,000	Tax	10,000
Long Term loans	40,000	Total Expense	47,000
Current Liabilities	30,000	Profit	<b>53,000</b>
	<b>170,000</b>		

- PBIT = Sales – COGS – Operating Expenses – Depreciation = 65,000
- Capital Employed = Total Assets – Current Liabilities = 170,000 – 30,000 = 140,000
- Or Capital Employed = Capital + Reserves + Long Term Liabilities = 140,000
- ROCE = PBIT/CE = 65,000/140,000 = 46.4%

**Profit Distributing Ability**

As the name suggests profit distributing ability shows the money that a company generates which can be distributed among the equity shareholders. A company may be having consistent positive PBIT, but due to high leverage it may not be in a position to distribute anything among the shareholders. Money available for distribution among the shareholders is the profit after meeting all expenses including the interest and statutory payments like taxes. Following ratios help in understanding the profit distributing ability of a company.

- Return on Networth (RONW)
- Earning Per Share (EPS)
- Dividend Per share (DPS)

**Return on Owners Fund or Net worth (RONW)**

This ratio shows the money available for the equity shareholders.

- RONW = (PAT – Preference Dividends)/Networth
- Net-worth = Equity shareholders money = Capital + Reserves, or
- Net-worth = Total Assets – Outsiders money

Table 17.11 shows RONW of some Indian companies.

RONW as on 31st March 2006			
	%		%
Bharat Petroleum Corpn. Ltd.	3%	Dabur India Ltd.	45%
Hindustan Petroleum Corpn. Ltd.	4%	Hero Honda Motors Ltd.	47%
Zee Entertainment Enterprises Ltd.	4%	Tata Consultancy Services Ltd.	48%
Mahanagar Telephone Nigam Ltd.	5%	Glaxosmithkline Pharmaceuticals Ltd.	55%
Reliance Energy Ltd.	8%	Hindustan Lever Ltd.	68%

Source: CMIE Data base

*Example 17.7*

Find RONW using the information given in the table 17.15

Balance Sheet		Income Statement	
Fixed Assets	30,000	Sales	50,000
Current Assets	50,000	COGS	20,000
Investments	20,000	Operating Expenses	10,000
	<b>100,000</b>	Depreciation	5,000
Capital	20,000	Interest	2,000
Reserves	30,000	Tax	10,000
Long Term loans	30,000	Total Expense	47,000
Current Liabilities	20,000	Profit	<b>3,000</b>
	<b>100,000</b>		

- $PAT = \text{Sales} - \text{All Expenses} - \text{Tax} = 3,000$
- $\text{Net-worth} = \text{Capital} + \text{Reserves} = 50,000$ , or
- $\text{Net-worth} = \text{Total Assets} - \text{Long Term Loans} - \text{Current Liabilities} = 50,000$
- $\text{RONW} = \text{PAT}/\text{Net-worth} = 3,000/50,000 = 6\%$

*Example 17.8*

PBIT = 25,000; Tax rate = 40%; Working Capital = 20,000; Current Liabilities = 30,000; Fixed Assets = 30,000; No other investments. Interest = 5,000; Rate of interest = 20%. Find RONW.

- $PAT = \text{PBIT} - \text{Interest} - \text{Tax} = (25,000 - 5,000) * 60\% = 12,000$
- $\text{Net-worth} = \text{Total Assets} - \text{Current Liabilities} - \text{Long Term Liabilities}$ 
  - $\text{Total Assets} = \text{Fixed Assets} + \text{Current Assets}$
  - $\text{Fixed Assets} = 30,000$
  - $\text{Current Assets} = \text{Current Liabilities} + \text{Working Capital} = 50,000$
  - $\text{Total Assets} = \text{FA} + \text{CA} = 80,000$
  - $\text{Long Term Liabilities} = \text{Interest}/\text{Rate of interest} = 25,000$
- $\text{Net-worth} = \text{Total Assets} - \text{Current Liabilities} - \text{Long Term Liabilities}$
- $\text{Net-worth} = 80,000 - 30,000 - 25,000 = 25,000$
- $\text{RONW} = \text{PAT}/\text{Net-worth} = 12,000/25,000 = 48\%$

**Earnings Per Share (EPS)**

EPS is a variation of RONW. It shows the earnings or profit available per share. It is calculated as follows:

- $\text{EPS} = \text{RONW} = (\text{PAT} - \text{Preference Dividends})/\text{Number of equity shares}$

As per the Accounting Standard (AS)20 all listed companies are required to show **basic** and **diluted** earnings per share with equal prominence for all periods presented. AS-20 explains the process of defining basic and diluted EPS.

**Basic EPS**

- Basic earnings per share should be calculated by dividing the net profit or loss for the period attributable to equity shareholders by the weighted average number of equity shares outstanding during the period.
- For the purpose of calculating basic earnings per share, the net profit or loss for the period attributable to equity shareholders should be the net profit or loss for the period after deducting preference dividends and any attributable tax thereto for the period.

- All items of income and expense which are recognised in a period, including tax expense and extraordinary items, are included in the determination of the net profit or loss for the period.
- *the number of equity shares should be the weighted average number of equity shares outstanding during the period*
- If an enterprise has more than one class of equity shares, net profit or loss for the period is apportioned over the different classes of shares in accordance with their dividend rights.

#### Diluted EPS

- For the purpose of calculating diluted earnings per share, the net profit or loss for the period attributable to equity shareholders and the weighted average number of shares outstanding during the period should be adjusted for the effects of all dilutive potential equity shares.
- the net profit for the period attributable to equity shares is:
  - increased by the amount of dividends recognised in the period in respect of the dilutive potential equity shares as adjusted for any attributable change in tax expense for the period;
  - increased by the amount of interest recognised in the period in respect of the dilutive potential equity shares as adjusted for any attributable change in tax expense for the period; and
  - adjusted for the after-tax amount of any other changes in expenses or income that would result from the conversion of the dilutive potential equity shares.

#### DuPont Analysis: Disaggregating ROI

DuPont analysis provides the framework to understand the drivers of ROI. In DuPont analysis, an effort is made to decompose ROI and go to the root cause of ROI. We undertake the DuPont analysis by taking any variation of ROI, viz ROTA, ROCE, or RONW.

Before we get into the details of DuPont Analysis let us go back to the classification of the business decisions. The business decisions can be broadly divided into three categories: Financing, Investment, and Operating Decisions. So the profitability or ROI will depend on these decisions.

#### First Level Disaggregation

ROI depends on Operating Decisions, Investment Decisions, Financing Decisions. So managing ROI means managing these decisions. Let us take Return on Capital Employed (ROCE) as the basis to understand DuPont Analysis.

- $ROCE = \text{Profitability Measures} * \text{Efficiency Measures} * \text{Leverage Measures}$
- $ROCE = \text{Profit Margin} * \text{Asset Turnover} * \text{Asset to Capital Employed}$
- $ROCE = \text{PBIT} / \text{Capital Employed}$
- $\text{Profit Margin} = \text{PBIT} / \text{Sales}$
- $\text{Asset Turnover} = \text{Sales} / \text{Total Asset}$
- $\text{Asset to Capital Employed} = \text{Total Asset} / \text{Capital}$

$$\text{ROCE} = \frac{\text{PBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{CE}}$$

*Example 17.8*

Table 17.16 shows relevant financial information relating to two companies. Comment on the performance.

Table 17.16		
Disaggregating Return on Capital Employed		
	A	B
SALES	100,000	200,000
PBIT	10,000	3,000
Capital Employed	100,000	20,000
Total Assets	300,000	20,000
ROCE	10%	15%
PBIT/SALES	10%	1.50%
SALES/TA	0.33	10
TA/CE	3	1

Let us investigate why the ROCE of A is lower than that of B. ROCE of A is low despite high profit margin. So low ROCE of A is due to low asset turnover ratio. In other words, it is possible that the A is using large quantity of assets to generate the present sales. Other interpretation can be that the efficiency with which B uses its assets is much higher than that of A. Total assets to capital employed ratio of A three times that of B. So the profit margin of A is very high but the asset turnover is very low. So it seems the A has huge quantity of assets. Similarly, though the ROCE of B is higher than that of A, the profit margin (PBIT/Sales) is very low. So there is a need to investigate the low profit margins of B.

<b>PBIT/ CE</b>	=	<b>PBIT/ Sales</b>	✳	<b>Sales/ Total Assets</b>	✳	<b>Total Assets/ CE</b>
<b>A 10%</b>	=	<b>10%</b>	✳	<b>0.33</b>	✳	<b>3</b>
<b>B 15%</b>	=	<b>1.5%</b>	✳	<b>1.0</b>	✳	<b>1.0</b>

### Second Level Disaggregation

Under the second level Disaggregation, each component i.e profit margin, asset turnover, and the leverage is disaggregated.

*Example 17.9*

### Disaggregating Profit Margin

Table 17.17 shows income statement of two companies. Examine why the profitability of the companies different.

Table 17.17

Income Statement		
	A	B
Sales	100,000	200,000
COGS	45,000	98,500
Gross Margin	55,000	101,500
Office Expenses	9,000	59,100
Selling Expenses	18,000	39,400
Depreciation	18,000	0
Total Expenses	45,000	98,500
PBIT	55,000	3,000

Profit margin depends on the sales and expenses. Expenses consist of cost of goods sold, office & administrative expenses, selling expenses, and depreciation. Since, PBIT was the basis of the Dupont Analysis, interest has not been considered. Interest and tax can be part of the analysis, if RONW has to be disaggregated.



Following exhibit shows the decomposition of profit margin.

<b>PBIT/Sales</b>	=	<b>Gross Profit/ Sales</b>	-	<b>Office Expenses/ Sales</b>		<b>Selling Expense/ Sales</b>		-	<b>Depreciation/ Sales</b>
<b>A 10%</b>	=	<b>55%</b>	-	<b>9%</b>		<b>18%</b>		-	<b>18%</b>
<b>B 1.5%</b>	=	<b>51%</b>	-	<b>29.5%</b>		<b>20%</b>		-	<b>0%</b>

### Gross Profit Analysis

One of the most important items on the income statement is the cost of goods sold. Sales less cost of goods sold is gross profit. Gross profit can change if there is change in the selling price, cost of goods sold, number of units sold, and inventory management. In the above example, though the profit margin (PBIT/Sales) of A is much better than that of B, the gross profit margin of both companies is same. So the low profit margin (PBIT/Sales) of B may be due to other expenses.

### Expenses Analysis

Gross profit less other expenses will be PBIT. Expenses may be classified into different types. In the above example, the expenses were classified into office expenses, selling expenses, and depreciation. DuPont analysis will help in understanding the relationship between expenses and sales. The Disaggregation of expenses will show the efficiency with which a company earns its revenue. In the above example, the office expenses of B is much higher than that of A. High office expense is responsible for low profit margin of B. On the other hand, the depreciation accounts of 18% of total sales of A. There is no depreciation in the case of B. High depreciation of A may be due to the high investment in the fixed assets. Such high fixed asset may affect the over all profitability in the short run due to high depreciation. So there is a need to disaggregate the asset turnover ratio.

### Disaggregating Asset Turnover

Return on capital employed is also influenced by the amount of investment in the assets. Sometimes, the high or low ROCE may be due to the low or high investment in the assets. There fore, there is need to understand whether there is an over-investment or under-investment. Disaggregating asset turnover, will help in answering the following questions:

- Is there an over-investment in the company?
- Is the company using its assets efficiently?
- Is the company creating assets to generate future profits?

Asset turnover shows the productivity of the assets. It shows the sales generated from the given investment in the assets. Total assets can be broadly classified into three categories: fixed assets, current assets, and investments. The amount of capital employed depends on the composition of the assets. Capital employed can be calculated as follows:

- Capital employed = Capital + Reserves & Surplus + Long Term Liabilities, or
- Capital employed = Total Assets – Current Assets, or
- Capital employed = Fixed Assets + Current Asset – Current Liabilities
- Capital employed = Fixed Assets + Net Working Capital

So capital employed can be managed by managing fixed assets and working capital. Sometimes, the capital employed may be high due to high fixed assets or current assets to low current liabilities

### Fixed Assets Turnover

Fixed Assets Turnover ratio shows the relationship between fixed assets and the sales. In a capital intensive companies, the sales to fixed assets may be lower than that of the non-capital intensive companies.

#### Example 17.9

Table 17.18 shows the income statement and balance sheet of ABC Ltd. Undertake DuPont analysis

Balance Sheet		Income Statement	
Fixed Assets	150,000	Sales	100,000
Current Assets	50,000	COGS	20,000
Investments	20,000	Operating Expenses	10,000
	<b>220,000</b>	Depreciation	5,000
Capital	60,000	Interest	2,000
Reserves	80,000	Tax	10,000
Long Term loans	50,000	Total Expense	47,000
Current Liabilities	30,000	Profit	<b>53,000</b>
	<b>220,000</b>		

1. Find ROCE = PBIT/ CE

	<b>ROCE</b>	<b>46%</b>
PBIT		65,000
CE		140,000

2. ROCE = PBIT/CE = PBIT/Sales \* Sales/TA \* TA/Capital Employed

$$\bullet 46\% = 65\% * 0.45 * 2$$

<b>Profit Margin</b>	<b>65%</b>		<b>Asset Turnover</b>	<b>0.45</b>		<b>Leverage</b>	<b>2</b>
PBIT	65,000	*	Sales	100,000	*	TA	220,000
Sales	100,000		TA	220,000		CE	140,000

### Economic Profit (EVA)

As discussed in the previous sections, profit is the output of the GAAP driven accounting assumptions. One of the important accounting assumptions is that the interest is treated as an expense, whereas the dividend is treated as distribution of profit. Sometimes, such assumption results in situations where the company shows the accounting profit but may be destroying the wealth of the shareholders. So to address such an anomaly, the concept of the residual profit (from the economics literature) has been made popularized as Economic Value Added by Stern and Stewart.

EVA measures whether the operating profit is enough compared to the total costs of capital employed. EVA is defined as excess of Net operating profit after taxes (NOPAT) over the capital charge.

Economic Value Added is calculated as follows:

- EVA = NOPAT – Capital Charge
- NOPAT = Net Operating Profit After Tax (before interest)
- Capital Charge = Cost of both Debt and Equity
- Capital Charge = WACC \* CE
- Capital Charge =  $K_e \text{ * Capital} + K_d \text{ * Debt}$

Cost of capital or Weighted average cost of capital (WACC) is the average cost of both equity capital and interest bearing debt. Cost of equity capital is the opportunity return from an investment with same risk as the company has. Cost of equity is usually defined with Capital asset pricing model (CAPM). The estimation of cost of debt is naturally more straightforward, since its cost is explicit. Cost of debt includes also the tax shield due to tax allowance on interest expenses.

## Example 17.10

Table 17.20 shows the income statement and balance sheet of ABC Ltd. You are required to find EVA.

Balance Sheet as on 31st Mar 06				Income Statement	
Sources	Amount	Assets	Amount		
Capital (10)	10,000	FA	20,000	Sales	20,000
Profits	22,000	Investment	3,000	COGS	10,000
LTL (10%)	10,000	Stock	15,000	Expenses	2,000
Creditors	11,000	Debtors	10,000	Depreciation	1,000
		Cash	5,000	Interest on LTL	1,200
					14,200
				PBT	5,800
				Tax (40%)	2,320
				PAT	<b>3,480</b>
	53,000		53,000		

Additional information: Risk free return ( $R_f$ ) = 7%; Market Return ( $R_m$ ) = 18%; Beta = 1.5

**Step I: Find NOPAT**

Different ways of determining NOPAT is shown by table 17.21

- $\text{NOPAT} = \text{Sales} - \text{Expenses (other than interest)} - \text{Tax}$
- $\text{NOPAT} = \text{PAT} + \text{Interest} - \text{Tax Benefits of interest}$
- $\text{NOPAT} = \text{PAT} + \text{Interest}(1-t)$

NOPAT		NOPAT		NOPAT	
Sales	20,000	PAT	3,480	PAT	3,480
Less		Add			
COGS	10,000	Interest	1,200	Add	
Expenses	2,000	Less		Net Interest	720
Depreciation	1,000	Tax Benefits of Interest	480		
	13,000				
NOPBT	7,000				
Less					
Tax	2800				
<b>NOPAT</b>	<b>4,200</b>	<b>NOPAT</b>	<b>4,200</b>		<b>4,200</b>

**Step II: Find Capital Employed**

Different ways of determining capital employed is shown by table 17.22

- Capital Employed = Capital + Profit + Long Term Liabilities + Interest Bearing Current Liabilities
- Capital Employed = Total Assets – Non Interest Bearing Current Liabilities
- Capital Employed = Fixed Asset + Investment + Working Capital
  - Working Capital = Current Asses – Non Interest Bearing Current Liabilities

Capital Employed		Capital Employed		Capital Employed	
Capital	10,000	Fixed Assets	20,000	Fixed Assets	20,000
Profits	22,000	Investments	3,000	Investments	3,000
LTL	10,000	Current Assets	30,000	Working Capital	19,000
		Less			
		Current Liabilities	11,000		
Capital Employed	42,000	Capital Employed	42,000	Capital Employed	42,000

**Step III: Find cost of debt and cost of equity**

- Cost of Debt ( $K_d$ ) =  $i(1-t) = 10\% (1-40\%) = 6\%$
- Cost of Equity ( $K_e$ ) =  $R_f + b (R_m - R_f) = 7\% + 1.5*(18\%-7\%) = 24\%$

**Step IV: Find Capital Charge**

- Capital Charge =  $K_e * \text{Equity} + K_d * \text{Debt}$

Capital Charge			
	Amount	Rate	Cost
Equity	32,000	24%	7,520
Debt	10,000	6%	600
Capital Charge			8,120

- Capital Charge can also be calculated as =  $WACC * \text{Capital Employed}$

Weighted Average Cost of Capital (WACC)			
$K_e$	24%	0.76	17.9%
$K_d$	6%	0.24	1.4%
WACC			19.3%

$$\text{Capital Employed} = 19.3\% * 42000 = 8120$$

Step V: Find EVA

- $\text{EVA} = \text{NOPAT} - \text{Capital Charge}$
- $\text{EVA} = 4200 - 8120 = \text{Negative } 3920$

EVA can also be determined as follows:

- $\text{EVA} = (\text{Rate of Return on Capital Employed} - \text{WaCC}) * \text{Capital Employed}$ 
  - Rate of Return on capital employed =  $\text{NOPAT} / \text{Capital Employed}$
  - Rate of Return on capital employed =  $4200 / 42000 = 10\%$
  - $\text{WaCC} = 19.3\%$
  - Capital Employed = 42,000
- $\text{EVA} = (10\% - 19.3\%) * 42,000 = \text{Negative } 3920$

The idea behind EVA is that shareholders must earn a return that compensates the risk taken. In other words equity capital has to earn at least same return as similarly risky investments at equity markets. If that is not the case, then there is no real profit made and actually the company operates at a loss from the viewpoint of shareholders. On the other hand if EVA is zero, this should be treated as a sufficient achievement because the shareholders have earned a return that compensates the risk. This approach - using average risk-adjusted market return as a minimum requirement - is justified since that average return is easily obtained from diversified long-term investments on stock markets. Average long-term stock market return reflects the average return that the public companies generate from their operations.

### Accounting Adjustments

As defined earlier EVA is the Net operating profit after taxes (NOPAT) subtracted with the cost of capital employed. But the calculation is not so simple as calculating the total capital employed is a difficult task due to the plethora of accounting distortion in the balance sheet. So there are more than 250 accounting adjustments as proposed by Stern Stewart to be done in moving to EVA. In practice most organisation do no more than fifteen relevant adjustment to do the calculation. The adjustment include netting the non-interest bearing liabilities against the current asset that means adding back to the equity the gross write-offs, reserves, provisions and capitalised value of the R & D and Advertising. These accounting adjustment are referred as **equity equivalents** and their effects on the Capital and NOPAT are summarised below.

**Add to Capital**

Equity Equivalents

Deferred tax reserve

Cumulative goodwill amortisation

Capitalised intangibles

Cumulative usual gains/losses

Other Reserves

(Bad debt, warranty etc.)

LIFO Reserves

Unrecognised goodwill

**Add to NOPAT**

Increase in Equity Equivalents

Increase in deferred tax reserve

Goodwill amortisation

Increase in intangibles

Usual gain/losses

Increase in Other Reserves

(Bad debt, warranty etc.)

Increase in LIFO Reserves

*Example 17.11*

Table 17.23 shows the balance sheet and Income Statement of ABC .

Balance Sheet as on 31st Mar 06				Income Statement	
Sources	Amount	Assets	Amount		
Capital (10)	20,000	FA	20,000	Sales	80,000
Profits	22,000	Investment	3,000	COGS	10,000
LTL (12%)	10,000	Goodwill	10,000	Expenses	2,000
Creditors	11,000	Stock	15,000	Goodwill	10,000
		Debtors	10,000	R&D Expenses	15,000
		Cash	5,000	Depreciation	1,000
				Interest on LTL	1,200
					39,200
				PBT	40,800
				Tax (40%)	26,320
	63,000		63,000	PAT	<b>14,480</b>

During the year the company acquired a new business and excess money paid over the book value of the asset taken over was Rs. 20,000. It decides to amortise it over two years. It had spent money of research and development and it was fully shown as an expense. For calculating EVA take cost of equity as 24%.

## Step II: Find NOPAT

NOPAT		NOPAT		NOPAT	
Sales	80,000	PAT	14,480	PAT	14,480
Less		Add			
COGS	10,000	Interest	1,200	Add	
Expenses	2,000	<b>Goodwill</b>	<b>10,000</b>	Net Interest	720
Depreciation	1,000	<b>R&amp;D Expenses</b>	<b>15,000</b>	<b>Goodwill</b>	<b>10,000</b>
	13,000	Less		<b>R&amp;D Expenses</b>	<b>15,000</b>
NOPBT	67,000	Tax Benefits of Interest	480		
Less					
Tax	26,800				
<b>NOPAT</b>	<b>40,200</b>	<b>NOPAT</b>	<b>40,200</b>		<b>40,200</b>

- While computing NOPAT , goodwill and R&D expenses have been added back.. These are not treated as an expenses.

## Step II: Find Capital Employed

Capital Employed		Capital Employed		Capital Employed	
Capital	20,000	Fixed Assets	20,000	Fixed Assets	20,000
Profits	22,000	Investments	3,000	Investments	3,000
LTL	10,000	Current Assets	30,000	Working Capital	19,000
Add		Goodwill	10,000	Goodwill	10,000
		EE		<b>EE</b>	<b>25,000</b>
		<b>Goodwill</b>	<b>10,000</b>		
<b>EE</b>	<b>25,000</b>	<b>R&amp;D Expenses</b>	<b>15,000</b>		
		Less			
		Current Liabilities	11,000		
<b>Capital Employed</b>	<b>77,000</b>	<b>Capital Employed</b>	<b>77,000</b>	<b>Capital Employed</b>	<b>77,000</b>

- Goodwill and R&D Expenses amortised have been removed from the income statement and added to the assets.



## Step III: Find Capital Charge

Capital Charge			
	Amount	Rate	Cost
Equity	42,000	24%	9,870
EE	25,000	24%	5,875
Debt	10,000	7.2%	720
Capital Charge			16,465

## Step IV: Find EVA

- $EVA = NOPAT - CC = 40,200 - 16,465 = 23,735$

## Accounting Adjustments

- EE = Equity Equivalent = Accounting Adjustments for converting accounting profit and accounting capital into economic profit and accounting capital
- EE = Goodwill amortised and R&D Expenses amortised
- $EE = 10,000 + 15,000 = 25,000$

**Market Value Added**

For listed companies Stewart defined another measure that assesses if the company has created shareholder value. If the total market value of a company is more than the amount of capital invested in it, the company has managed to create shareholder value. If the case is opposite, the market value is less than capital invested, the company has destroyed shareholder value. Stewart calls that difference between the company's market and book value as Market

**Market Value Added = Company's Total Market Value - Capital Invested**

and with simplifying assumption that market and book value of debt are equal, this is the same as:

**Market Value Added = Market Value of Equity - Book Value of Equity.**

Book value of equity refers to all equity equivalent items like reserves, retained earnings and provisions. In other words, in this context, all the items that are not debt (interest bearing or non-interest bearing) are classified as equity.

According to Stewart Market value added tells us how much value company has added to, or subtracted from, its shareholders' investment. Successful companies add their MVA and thus increase the value of capital invested in the company. Unsuccessful companies decrease the value of the capital originally invested in the company. Whether a company succeeds in creating MVA (increasing shareholder value) or not, depends on its rate of return. If a company's rate of return exceeds its cost of capital, the company will sell on the stock markets with premium compared to the original capital (has positive MVA). On the other hand, companies that have rate of return smaller than their cost of capital sell with discount compared to the original capital invested in company. Whether a company has positive or negative MVA depends on the level of rate of return compared to the cost of capital. All this applies also to EVA. Thus positive EVA means also positive MVA and vice versa.