

Basic Accounting Principles

- The accountant and engineer may work with the same financial data, but they do so for different purposes.
- Each view a firm's profitability from a different perspective.
- The accountant is concerned with evaluating the results of how profitable the firm has been as a result of past decisions.
- The engineer attempts to predict what the profitability of a current or future decision will be.
- If the engineer has done his/her job, the accountant will eventually find a profit.
- The primary function of an accounting system is to record, classify, summarize, and interpret the financial data of an organization.
- A prime source of data for engineering economics is the records of a firm.
- The engineer must be careful in the use of this financial data.
- Average costs and allocated costs must be recognized for what they are.
- Engineering economic analysis generally concerns itself with incremental costs.

Balance Sheet

Assets – everything of value owned by a firm or owed to it

Liabilities – debts or obligations which must eventually be paid

$$\text{Assets} - \text{Liabilities} = \text{Owners' Equity}$$

OR

$$\text{Assets} = \text{Liabilities} + \text{Owners' Equity}$$

The Balance Sheet is a snapshot of the financial position of a firm on a particular date.

- All entries are at book (original cost) value
- GAAP – Generally Accepted Accounting Principles
- IFRS – International Financial Reporting Standards
- Accrual Basis versus Cash Basis accounting methods
- Financial statements do not attempt to account for inflation

Sample Balance Sheet

Datacomm Company

Balance Sheet

December 31, 201x

<u>Assets</u>		<u>Liabilities + Owners' Equity</u>	
<u>Current Assets</u>		<u>Current liabilities</u>	
Cash	25 000	Accounts payable	32 000
Accounts receivable	<u>115 000</u>	Taxes payable	<u>15 000</u>
Total C/A	140 000	Total C/L	47 000
 <u>Fixed Assets</u>		 <u>Long-Term Liabilities</u>	
Land	30 000	Mortgage loan	130 000
Building	200 000	Bond issue	<u>350 000</u>
Less: Acc. depreciation ¹	<u>50 000</u>	Total LT/L	480 000
	150 000	Total liabilities	527 000
 Equipment 750 000		 <u>Owners' Equity</u>	
Less: Acc. depreciation ¹	<u>150 000</u>	Common stock	325 000
	<u>600 000</u>	Retained earnings	<u>68 000</u>
Total F/A	<u>780 000</u>	Total equity	<u>393 000</u>
Total assets	<u>920 000</u>	Total liabilities & OE	<u>920 000</u>

¹ Accumulated depreciation

Sample Income Statement

- Shows the revenues and expenses incurred by the firm during a stated period of time (the accounting period)

Profit = Revenues – Costs (Matching Principle)

Datacomm Company

Income Statement

Year Ending December 31, 201x

Sales		\$1 200 000
Less cost of goods sold		
Direct labour	\$420 000	
Direct material	302 000	
Indirect labour	112 000	
Depreciation	98 000	
Repairs and maintenance	41 500	
Utilities	<u>11 500</u>	<u>985 000</u>
Gross profit		215 000
Less other expenses		
Administration	76 000	
Marketing	49 000	
Interest Payments	<u>35 000</u>	<u>160 000</u>
Net profit before tax		55 000
Less income taxes		<u>27 500</u>
Net profit		<u>27 500</u>

Small Business Start-Up

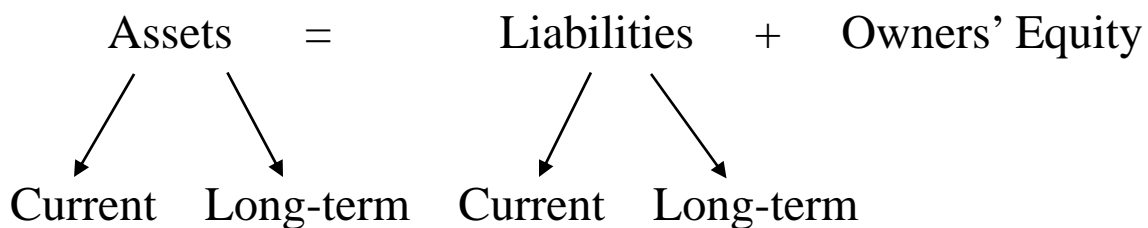
Five types of transactions to consider:

1. Financing – capital structure of the business
2. Capital budget – expenditures on long-term assets
3. Inventory – expenditures on raw materials
4. Working capital – pay the bills
– deposit customers' payments
5. Sales – record the sale and the associated cost

Consider a small business starting up on September 1st and operating for the month of September.

Note that each transaction is recorded in two places on the accounts. This is known as the “Double Entry” system of accounting.

Each transaction must satisfy the Fundamental Accounting Equation.



Balance Sheet “Worksheet 1”

1. \$50 000 investment by the owner

2. \$20 000 bank loan
 - one-quarter due every 6 months

3. Purchase of equipment for \$40 000
 - COD (Cash on delivery)

4. Purchase of computer for \$5 000
 - Invoiced – terms – net 30 days

5. Purchase of materials for sale
 - \$4 000 invoiced on net 10-day terms

Using transactions 1–5 prepare the opening Balance Sheet as of September 1st.

Balance Sheet “Worksheet 2”

6. Pay for materials – \$4 000 to vendor

What would the Balance Sheet look like on September 10th?

7. Sell \$2 000 worth of inventory to customers for \$4 000 invoiced on a net 30-day basis during the month of September.
8. Employees were paid \$500 for the month of September.
9. Advertising flyers were distributed at a cost of \$200.
10. The bank interest charge was \$100 for the month of September.

Prepare the closing Balance Sheet as of September 30th.

How would you reflect customers paying their invoices in October?

Completed Balance Sheet

Small Business
Balance Sheet
Sept 30, 201x

Assets

Liabilities + Owner's Equity

Current Assets

Current Liabilities

Total Current Assets _____

Total Current Liabilities _____.

Fixed Assets

Long-Term Liabilities

Total Fixed Assets _____

Total L-T Liabilities _____.

Total Liabilities _____.

Owner's Equity

Total Assets _____

Total Liabilities + OE _____.

Fundamental Accounting Equation:
Assets = Liabilities + Owner's Equity

Cost of Goods Sold (CGS)

- Attempts to measure the costs associated with making the sales for the accounting period
- Remember the Matching Principle
- For CGS the payment status for the goods used is unimportant

Accounting Definition of Cost of Goods Sold

Cost of Goods Sold:

Beginning-of-period inventory	0	
Plus: Purchases during period	4 000	
Less: End-of-period inventory	<u>2 000</u>	2 000

Cost of Goods Sold during the accounting period	<u>2 000</u>
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- Inventory levels are assessed using a physical audit at the beginning and end of the accounting period
- The beginning-of-period inventory represents unused raw materials from the previous accounting period (\$0 for a start-up business)

Completed Income Statement

Small Business
Income Statement
Month Ending September 30, 201x

Sales		\$4 000
Costs of Goods Sold		
Materials	2 000	
Wages	<u>500</u>	<u>2 500</u>
Gross Profit		1 500
Less other expenses		
Advertising	200	
Interest	100	<u>300</u>
Net profit		<u>1 200</u>

What is the Owner's Equity on September 30th if the owner took a draw from the profits of \$200 during September?

How would this be reflected on the Balance Sheet?

Valuation

Value is a measure of the worth of something in terms of money.

Book Value

- the worth of an asset for accounting purposes
- based on historical cost less accumulated depreciation
- current market value if less becomes the new book value

Market Value

- the price at which an asset can be sold

Going Concern Value

- how much the assets of an organization are worth as an operating unit
- reflects profitability of a company, experience of the employees, established customer base, value of proprietary technology

Liquidation Value

- amount that could be realized if the assets were sold separately from the organization using them
- usually (going concern value) > (liquidation value)

Goodwill

- In accounting, Goodwill is the difference between the value of a business enterprise as a whole and the sum of the current fair market value of its net assets
- Goodwill is an intangible asset
- An accounting entry for Goodwill is made when a company is purchased at a price above the fair market value of its net assets.

IBM Consolidated Statement of Financial Position

(IBM 1990 Annual Report)

At December 31:	1990	1989
(Dollars in millions)		
Assets		
Current Assets:		
Cash	\$ 1,189	\$ 741
Cash equivalents	2,664	2,959
Marketable securities, at cost, which approximates market	698	1,261
Notes and accounts receivable—trade, net of allowances	20,988	18,866
Other accounts receivable	1,656	1,298
Inventories	10,108	9,463
Prepaid expenses and other current assets	1,617	1,287
	38,920	35,875
Plant, Rental Machines and Other Property	53,659	48,410
Less: Accumulated depreciation	26,418	23,467
	27,241	24,943
Investments and Other Assets:		
Software, less accumulated amortization (1990, \$5,873; 1989, \$4,824)	4,099	3,293
Investments and sundry assets	17,308	13,623
	21,407	16,916
	\$87,568	\$77,734
Liabilities and Stockholders' Equity		
Current Liabilities:		
Taxes	\$ 3,159	\$ 2,699
Short-term debt	7,602	5,892
Accounts payable	3,367	3,167
Compensation and benefits	3,014	2,797
Deferred income	2,506	1,365
Other accrued expenses and liabilities	5,628	5,780
	25,276	21,700
Long-Term Debt	11,943	10,825
Other Liabilities	3,656	3,420
Deferred Income Taxes	3,861	3,280
Stockholders' Equity:		
Capital stock, par value \$1.25 per share	6,357	6,341
Shares authorized: 750,000,000		
Issued: 1990—571,618,795; 1989—574,775,560		
Retained earnings	33,234	30,477
Translation adjustments	3,266	1,698
	42,857	38,516
Less: Treasury stock, at cost (Shares: 1990—227,604; 1989—75,723)	25	7
	42,832	38,509
	\$87,568	\$77,734

The notes on pages 43 through 58 are an integral part of this statement.

IBM Consolidated Statement of Earnings

(IBM 1990 Annual Report)

For the year ended December 31:	1990	1989	1988
(Dollars in millions except per share amounts)			
Revenue:			
Sales	\$43,959	\$41,586	\$39,959
Support services	11,322	9,858	9,285
Software	9,952	8,424	7,927
Rentals and financing	3,785	2,842	2,510
	69,018	62,710	59,681
Cost:			
Sales	19,401	18,001	17,499
Support services	6,617	5,701	4,971
Software	3,126	2,694	2,110
Rentals and financing	1,579	1,305	1,068
	30,723	27,701	25,648
Gross Profit	38,295	35,009	34,033
Operating Expenses:			
Selling, general and administrative	20,709	21,289	19,362
Research, development and engineering	6,554	6,827	5,925
	27,263	28,116	25,287
Operating Income	11,032	6,893	8,746
Other Income, principally interest	495	728	996
Interest Expense	1,324	976	709
Earnings before Income Taxes	10,203	6,645	9,033
Provision for Income Taxes	4,183	2,887	3,542
Net Earnings before Cumulative Effect of Accounting Change	6,020	3,758	5,491
Cumulative Effect of Change in Accounting for Income Taxes	—	—	315
Net Earnings	\$ 6,020	\$ 3,758	\$ 5,806
Per share amounts:			
Before cumulative effect of accounting change	\$10.51	\$6.47	\$9.27
Cumulative effect of change in accounting for income taxes	—	—	.53
Net earnings	\$10.51	\$6.47	\$9.80
Average number of shares outstanding:			
1990—572,647,906			
1989—581,102,404			
1988—592,444,409			

The notes on pages 43 through 58 are an integral part of this statement.

Financial Statement Interpretation

Working Capital

- funds used to meet the daily financial obligations of the company

$$\begin{aligned}\text{WC} &= \text{current assets} - \text{current liabilities} \\ &= 38\,920 - 25\,276 \\ &= 13\,644\end{aligned}$$

Current Ratio

- working capital ratio

$$\begin{aligned}\text{CR} &= \frac{\text{current assets}}{\text{current liabilities}} \\ &= \frac{38\,920}{25\,276} \\ &= 1.54\end{aligned}$$

Financial Statement Interpretation

Quick-Asset Ratio (Acid-Test Ratio)

- a more conservative liquidity ratio
- goods in inventory might not sell

$$\begin{aligned}\text{ATR} &= \frac{\text{current assets} - \text{inventories} - \text{prepaid expenses}}{\text{current liabilities}} \\ &= \frac{38\,920 - 10\,108 - 1\,167}{25\,276} \\ &= 1.08\end{aligned}$$

Financial Statement Interpretation

Equity Ratio

- financial strength of the firm

$$\begin{aligned} \text{ER} &= \frac{\text{owners' equity}}{\text{total assets}} \\ &= \frac{42\,832}{87\,568} \\ &= 48.9\% \end{aligned}$$

Debt to Equity Ratio

- relative magnitude of debt to equity
- operating risk versus financial risk
- leverage – use of debt financing
 - magnifies operating results
- DER reflects the financial risk of a company

$$\begin{aligned} \text{DER} &= \frac{\text{long-term liabilities}}{\text{owners' equity}} \\ &= \frac{11\,943}{42\,832} \\ &= 27.9\% \end{aligned}$$

Financial Statement Interpretation

Operating Ratio

- operating ratio greater than 1.0 indicates a net profit
- comparison of different product lines or plants

$$\begin{aligned}\text{OR} &= \frac{\text{total revenues}}{\text{total expenses}} \quad (\text{before income tax}) \\ &= \frac{69\,018}{30\,723 + 27\,263 + 829} \\ &= 1.17\end{aligned}$$

Income Ratio

- net after-tax profit margin on gross revenues

$$\begin{aligned}\text{IR} &= \frac{\text{net profit}}{\text{total revenue}} \times 100\% \\ &= \frac{6\,020}{69\,018} \times 100\% \\ &= 8.7\%\end{aligned}$$

Operating Ratio By Business Segment

IBM 1990

(\$ Billions)

	<u>Sales</u>	<u>Support Services</u>	<u>Software</u>	<u>Rentals & Financing</u>
Revenue	44	11	10	4
Cost	19	7	3	2
Alloc.Cost ¹	18	4	4	2
Total Cost	37	11	7	4
OR	1.19	1.00	1.43	1.00

¹Costs allocated on a percentage revenue basis:

% of Sales	64%	16%	14%	6%
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$$\begin{aligned}
 \text{Cost to be allocated} &= \text{Op Expenses} + \text{Net Interest Cost} \\
 &= 27\,263 + 829 \\
 &= 28\,092
 \end{aligned}$$

Financial Statement Interpretation

Rate of Return on Investment

- rate of return on the asset base

$$\begin{aligned}\text{RRI} &= \frac{\text{net profit}}{\text{total investment}} \times 100\% \\ &= \frac{6\,020}{87\,568} \times 100\% \\ &= 6.8\%\end{aligned}$$

Inventory Turnover Ratio

- the number of times a company has sold its entire inventory during the accounting period

$$\begin{aligned}\text{ITR} &= \frac{\text{cost of goods sold}}{\text{inventory}} \\ &= \frac{30\,723}{10\,108} \\ &= 3.0\end{aligned}$$