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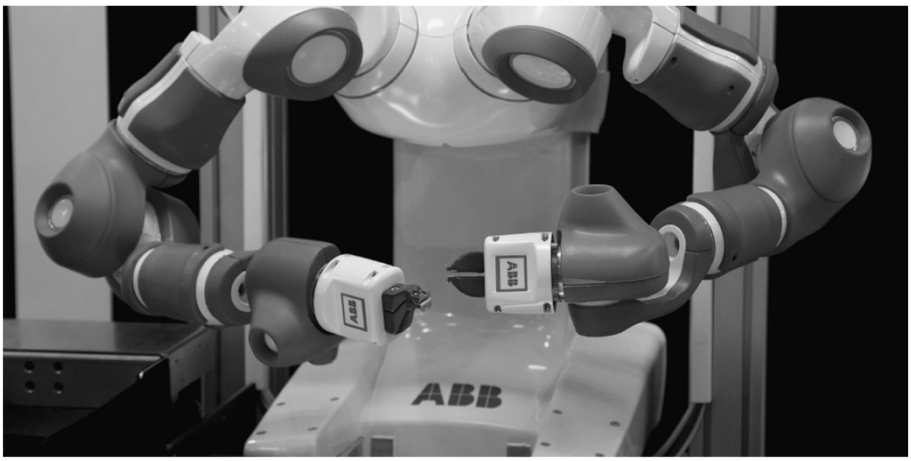
Lectures 15 and 16
Accounting and the Engineering Economy

The Two Faces of ABB



The Two Faces of ABB, cont'd

- ABB Ltd was a world leader in the power and automation technology areas in the late 1990s
- Assigned overhead costs to its divisions on equal basis although some activities incurred more costs than others
- Switched to activity-based costing (ABC), which assigns costs to the activities that actually incur them
- One of its serious problems arose at Combustion Engineering (an American subsidiary) due to numerous asbestos liability claims
- ABB also issued poor third-quarter earnings report after assuring about being on target to improve earnings and decrease debt
- The price of ABB shares nose-dived and credit rating agencies viewed the company's bonds poorly
- ABB recovered, and as of December 2016 was one of the largest engineering conglomerates in the world
- Connection to course: accounting affects success of engineering firms

Learning Objectives

- Describe the links between engineering economy and accounting
- Describe the objectives of general accounting, explain what financial transactions are, and show how they are important
- Use a firm's balance sheet and associated financial ratios to evaluate the firm's health
- Use a firm's income statement and associated financial ratios to evaluate the firm's performance
- Use traditional absorption costing to calculate product costs
- Understand the greater accuracy in product costs available with ABC

The Role of Accounting

- Engineering economy focuses on the financial aspects of projects, whereas accounting focuses on the financial aspects of firms
- Three functions within businesses:
  1) **Engineering economics:** Analyzes economic impact of alternatives and projects over their life cycles

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The Role of Accounting

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  3) **Accounting**:
     a) Records, reports, and analyzes transactions
     b) Assesses the financial impacts of past decisions
     c) Reports on the financial state of a unit or firm

Why Might Accounting Matter to You?

- You might start a company, which will require keeping financial records, and preparing financial forecasts
- You might work at a small company where accounting information directly or indirectly affects your job, such as the implications of hiring new staff
- You might work at a company that is considering purchasing another company and needs to evaluate the financial health of that company
- You might personally invest in stocks or bonds issued by firms, and want to be able to evaluate the financial health of those firms

The Role of Accounting

- Accounting for Business Transactions
  - A business transaction involves two (or more) parties and the exchange of dollars (or a commitment to the future exchange of dollars) for a product or service

FINANCIAL STATEMENTS

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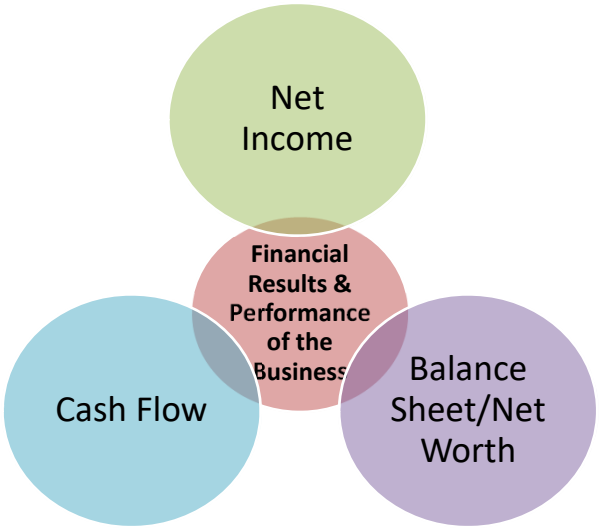
Primary Financial Statements

- Each has unique function
- Together provide coordinated view
- Examples:

Flows vs stocks

Reservoir example: volume / ML vs net flow L / year

Personal bank statement



Financial Statements

- Consider:
  - Timing: one point in time vs over a time period
  - Purpose of each statement: view provided
  - Items Included in the statement
  - Historical versus Projected
  - Audience:
  - Connection between Financial Statements

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1. The Balance Sheet

- **Assets**: All things the firms owns that have monetary value
  - Includes:
  - Assets are valued at:
- **Liabilities**: All of the money the firm owes to others
  - Short-term (current):
  - Long-term:
- **Equity (or net worth)**: Value of the firm.
  - Represents funding from the firm and its owners (the shareholders).
- **Fundamental accounting equation**:
  - Assets = Liabilities + Equity

Otherwise said, the net worth of a firm equals all the positives (assets) minus all the negatives (liabilities). If the firm were to close, all the assets would be sold, the liabilities would first be paid off, and the owners would get the rest of the money

Balance Sheet Items: Current vs Long Term

- **Current assets:**

  Are expected to be or could be converted into cash within 12 mo

- **Long Term assets:**

  – Valued at:

  (such as company land or factories) are not expected to be converted into cash during the company's normal course of operations. Valued at book value

Balance Sheet Items: Current vs Long Term

- **Current liabilities:**

  Debts must be paid within 1 yr

- **Long-term liabilities:**

  Debts that will be paid over more than 1 yr

An Example Balance Sheet

Balance Sheet for Engineered Industries, December 31, 2016 (all amounts in $1,000s)

Assets		Liabilities	
Current assets		Current liabilities	
Cash	1,940	Accounts payable	1,150
Accounts receivable	950	Notes payable	80
Securities	4,100		
Inventories	1,860	Accrued expense	950
(*minus*)Bad debt provision	−80	Total current liabilities	2,180
Total current assets	8,770		
		Long-term liabilities	1,200
		Total liabilities	**3,380**
Fixed assets			
Land	335		
Plant and equipment	6,500		
(*minus*)Accumulated depr.	−2,350		
Total fixed assets	4,485	**Equity**	
		Preferred shares	110
Other assets		Common shares	650
Prepays/deferred charges	140	Capital surplus	930
Intangibles	420	Retained earnings	8,745
Total other assets	560	Total equity	10,435
Total assets	**13,815**	**Total liabilities and equity**	**13,815**

This would actually be listed right after Accts Receivable, if shown at all.

"Prepaids" are actually always Current Assets.

FIGURE 2-1 Sample balance sheet.

Balance Sheet example, cont'd

- For Engineered Industries
  - Total current and long-term assets are $13,815,000
  - Total current and long-term liabilities are $2,180,000 and $1,200,000, respectively
  - Total equity is $10,435,000
- Fundamental accounting equation:
  - Assets = Liabilities + Equity
  - $13,815,000 = $3,380,000 + $10,435,000

2. Net Worth Statement

- Presents the solvency of the firm by reporting the firm's assets and liabilities at one point in time.
- Assets and liabilities are valued at:
  - Value that an asset would sell for in the marketplace at one point in time if sold to a knowledgeable, arms-length and willing buyer and a reasonable time is allowed to complete the transaction.

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Net Worth Statement

Market Value Estimations

Methodologies

1. Direct Comparison Approach - value estimated by analyzing completed sales, listings or pending sales of properties that are similar to the subject property. Need to adjust for differences.
2. Cost Approach – determine the cost to replace or reproduce the asset – adjust for physical wear and tear, functional deficiencies and external influences (easiest with newer assets)
3. Income Approach – estimates property's annual income and expenses to convert the net income into a present value.

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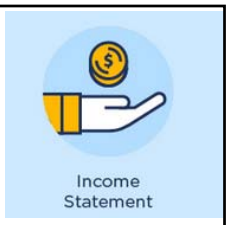
3. The Income Statement



- Summarizes the firm's revenues and expenses over a period of time (month, quarter, year, etc.) associated with operating activities
- Profit or loss result: demonstrates financial efficiency, potential for growth
- Also known as the profit and loss statement
  - **Revenue (R):**
  - **Expenses (E):**
    - Main 2 types:
  - **Net Income (Profit/ Loss)**:

Example Income Statement

Income Statement for Engineered Industries for End of Year 2016 (all amounts in $1,000)

Operating revenues and expenses	
Operating revenues	
Sales	18,900
(*minus*) Returns and allowances	−870
Total operating revenues	**18,030**
Operating expenses	
Cost of goods and services sold	
Labour	6,140
Materials	4,640
Indirect cost	2,280
Selling and promotion	930
Depreciation	450
General and administrative	2,160
Lease payments	510
Total operating expense	**17,110**
Total operating income	**920**
Non-operating revenues and expenses	
Rents	20
Interest receipts	300
Interest payments	−120
Total non-operating income	**200**
Net income before taxes	**1,120**
Income taxes	390
Net profit (loss) for Year 2016	**730**

Nomenclature correction: "amortization", not "depreciation"

Nomenclature corrections: "income", not "receipts" "expense", not "payments"

FIGURE 2-2 Sample income statement.

Income Statement example, cont'd

- For Engineered Industries:
  - Total revenues = $18,350,000
  - Total expenses = $17,230,000
  - Net income = Revenues – Expenses = $18,350,000 - $17,230,000 = $1,120,000 before taxes [= $730,000 after taxes]

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Example 2-1

For simplicity, assume that Engineered Industries will not pay dividends in 2015 and did not sell any capital equipment. It did purchase $4,000,000 in capital equipment. Use the linkages just described to decide what can be said about the values on the balance sheet at the end of 2016.

- Net income = Revenues – Expenses = $730,000 after taxes
- Asset depreciation of $450,000
- Capital equipment purchase of $4,000,000
- *Notice that the capital equipment purchase doesn't appear on the income statement: it goes on a different statement.*

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- Net income = Revenues – Expenses = $730,000 after taxes
- Capital equipment purchase of $4,000,000
- Will appear as a change in Assets
- Asset depreciation of $450,000

Balance Sheet for Engineered Industries, December 31, 2016 (all amounts in $1,000s)

Assets		**Liabilities**	
Current assets		Current liabilities	
Cash	1,940	Accounts payable	1,150
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Securities	4,100		
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Land	335		
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The Income Statement, cont'd

EXAMPLE 2-1

For simplicity, assume that Engineered Industries will not pay dividends in 2015 and did not sell any capital equipment. It did purchase $4,000,000 in capital equipment. Use the linkages just described to decide what can be said about the values on the balance sheet at the end of 2016.

SOLUTION

First, the net profit of $730,000 will be added to the retained earnings from the end of 2015 to find the new retained earnings at the end of 2016:

$$RE_{12/31/2012} = \$730{,}000 + \$8{,}745{,}000 = \$9{,}475{,}000$$

Second, the fixed assets shown at the end of 2015 would increase from $6,500,000 to $6,900,000. (*Note*: That is a major investment of the retained earnings in the firm's physical assets.)

Third, the accumulated depreciation would increase by the $450,000 in depreciation shown in the 2016 income statement from the $2,350,000 shown in the 2015 balance sheet. The new accumulated depreciation on the 2016 balance sheet would be $2,800,000. Combined with the change in the amount of capital equipment, the new fixed asset total for 2016 would equal

$$\$335{,}000 + \$6{,}900{,}000 - \$2{,}800{,}000 = \$4{,}435{,}000$$

Textbook error: Capital purchase was $4,000,000, not $400,000.

4. Cash Flow Statement

Cash Flow Statement

Portrays liquidity of a firm

Relationship to Income Statement:

Meets specific needs: Focused on:

- **Cash Inflow** money (cash and cash-equivalents) going into a business
- **Cash Outflow** money (cash and cash-equivalents) going out of the business
- **Net Cash Flow** difference between a cash inflows and outflows during a specific time period and represents the change in a company's cash balance

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Recording Accounting Transactions: Examples

- Example 1: $500,000 loan taken to expand the business soon
  - 'Cash' ledger goes up by $500,000.
  - 'Notes payable' also goes up by $500,000.
  - They balance out.
- Example 2: Contract signed to sell $300,000 of product to another firm.
  - 'Revenue' ledger credited for $300,000.
  - 'Accounts receivable' ledger debited for $300,000.
  - They balance out.
- All transactions follow this 'double entry' model. Entries always balance out.

FINANCIAL STATEMENTS

Financial Statement Coordination

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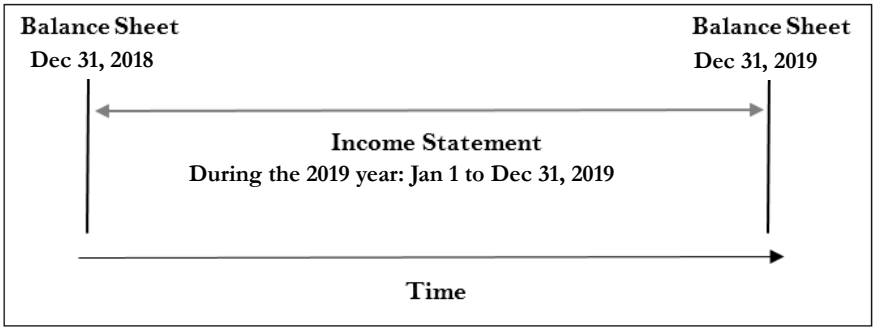
How are Financial Statements "Coordinated"?

Timing of the statement is important to note!

- Net Income during a time period (ex During 2019 ending Dec 31)
  - Closing of the NI statement for the year (sum of R & E during the year
- Balance Sheet at one point in time (ex On Dec 31, 2018 and Dec 31, 2019)



Cash Focus: the Balance Sheet

- Firms can only make short-term financial decisions if they have cash to support those.
- Some money is tied up in long-term assets or liabilities. That money can't be accessed very easily.
- Short term money, on the other hand, can be. It's called 'Working Capital'.
  - Working capital = Current assets – Current liabilities
  - For Engineered Industries, there would be $8,770,000 − $2,180,000 = $6,590,000 available in working capital

Uses of Operating Revenues

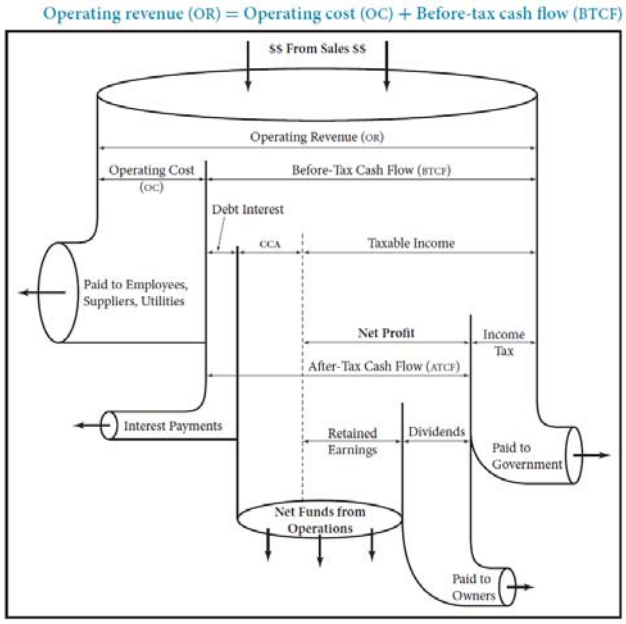


FIGURE 12-2 The operations cash flow pipeline.

Using the Financial Statements, cont'd

- Retained earnings:
  - The overall profit or loss during the year (shown on the income statement) is reflected in the change in retained earnings (RE) between the balance sheets at the beginning and end of the year

Sources and Uses of Cash

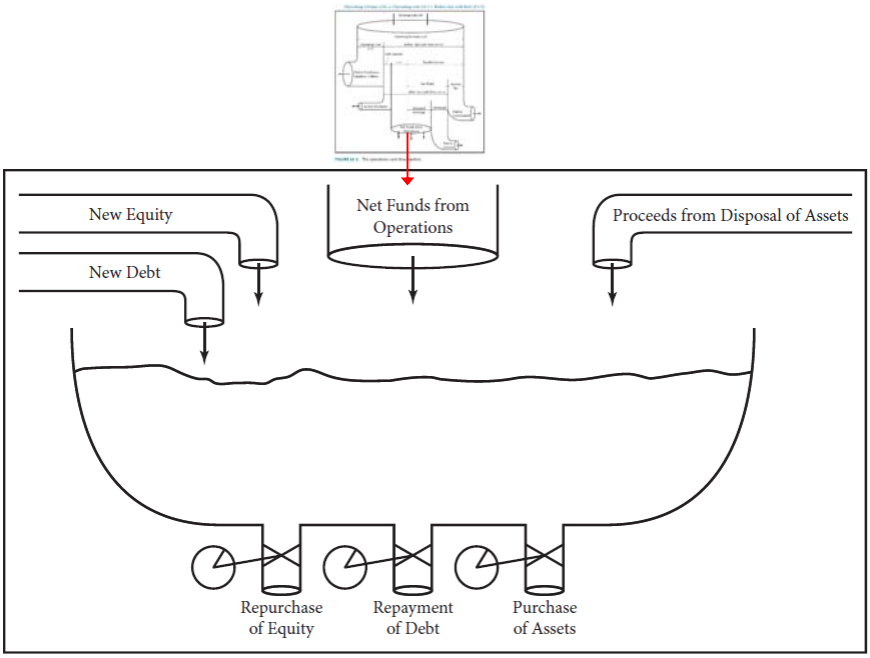


FIGURE 12-3 Sources and uses of cash.

Using the Financial Statements, cont'd

- Sources and Uses of Cash:
  - To find the change in cash, one must:
  - i. Take ATCF, and subtract any dividends distributed to the owners.
  - ii. Add the value of any new capital stock sold, new borrowed money, and any revenue from selling assets
  - iii. Subtract the amounts of equity repurchased, debt principal repaid, and new assets purchased

Example 2-1 revisited

Retained Earnings (2016) = Retained Earnings (2015) + Net Income/Loss Issued – Dividends

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Example 2-1 only included two of these elements.

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COST ACCOUNTING

Sidebar topic

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Traditional Cost Accounting

- **Cost accounting**:
- Cost accounting is a method of assigning costs to products or services. It is used to better understand the mix of costs involved in a particular product, and to understand the relative costs, revenues, and profits of various products, and how they compare with industry norms and firm expectations of profit, as well as to evaluate outsourcing and subcontracting possibilities.

Traditional Cost Accounting, cont'd

- Direct and Indirect Costs
  - Ideal method
  - Rationale
  - Real situation
  - Costs incurred to produce a product or service are traditionally classified as either direct or indirect (overhead)
  - **Direct costs**: Activities directly associated with the final product or service produced (examples:) materials, labor, etc
  - **Indirect costs**: Costs not easily linked directly to individual products or services (examples:).
    Sometimes called:
    Overhead

    Machine depreciation, management, sales, finance/accounting, administration/support

Traditional Cost Accounting, cont'd

- Indirect Cost Allocation
  - Indirect costs are sometimes allocated across projects through "absorption costing"
  - Allocating overhead costs based on proxies, like
    - # of staff in each project group, or
    - direct-labour costs by group or possibly by project, or
    - direct-materials cost, or
    - total direct costs by group or possibly by project

Cost Accounting Methods

- Problems with Traditional Cost Accounting
  - Indirect / overhead cost allocation can distort product costs and the decisions based on those costs
  - Some firms are shifting to activity-based costing (ABC), where activities are linked to specific costs. This shifts indirect costs to direct costs.

Cost Accounting Methods

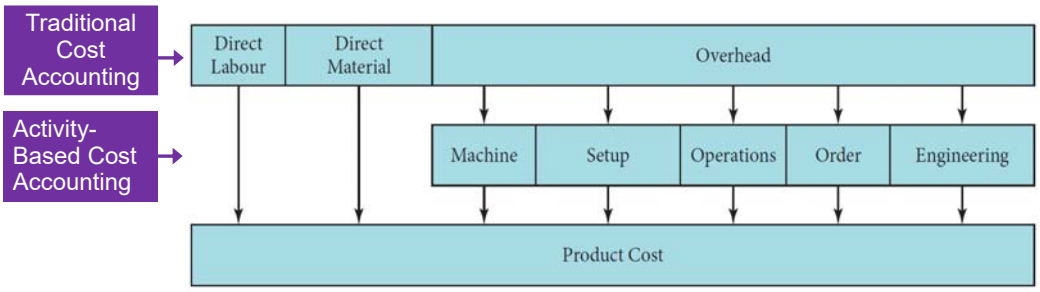


FIGURE 2-3 Activity-based costing versus traditional overhead allocation.

Common Accounting/Reporting Challenges

- Centralized accounting systems have often been accused by project managers of being too slow or "untimely"
- If an organization establishes numerous files and systems so that stakeholders have the timely data they need, the level of accuracy in one or all systems may be low
  - Analysts making cost estimates will have to consider other internal data sources.
- Inventory or land valued too low because its based on acquisition cost
  - Examples
- Capital equipment being valued too high or too low depending on the depreciation methods and company policy

- Metro Vancouver example of challenges: project progress accounting

Definitions: Clear and Otherwise

- Different terms are sometimes used for the same thing
- Sometimes a term is defined by different groups in different and conflicting ways
- Language used by accountants, engineers, economists, financial people can vary
  - examples

Definitions: Some aren't so clear

Examples:

"Net":

usually means 'net of', meaning something has been subtracted out.

Net revenue = revenue minus cost = Before-Tax Cash Flow

This is sometimes called 'gross profit'

"Net profit":

some say: = revenues minus variable costs minus fixed costs

other say: net profit = profit after taxes ≠ BTCF minus taxes

This will come up in Chapter 11 and 12 material.

Definitions: Some aren't so clear

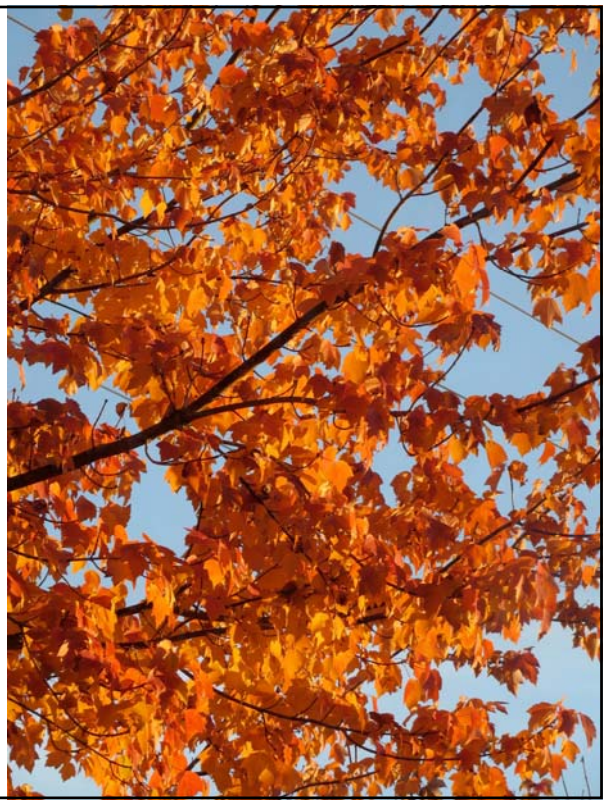
Other Examples:

"Net Present Worth" vs "Net Present Value"

"business case"

"initial cost" vs "capital cost"

Potential break point



FINANCIAL RATIOS AND ANALYSES

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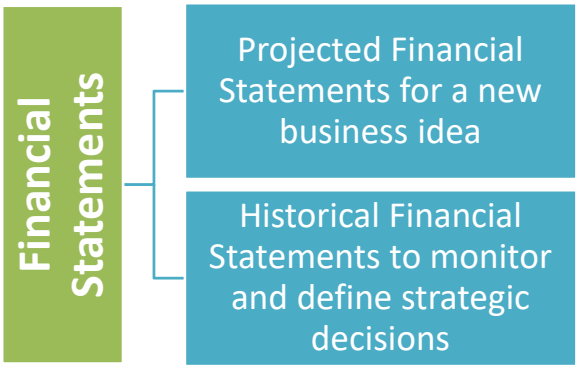
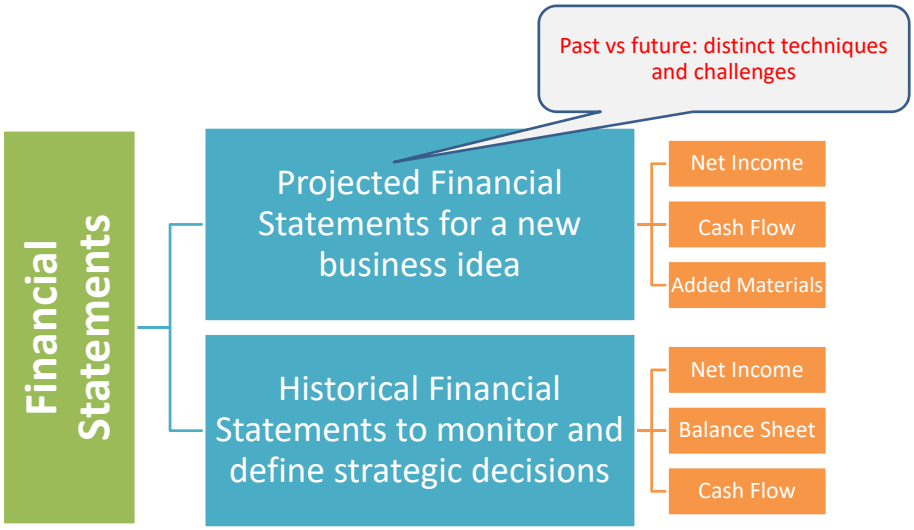
Using Financial Statements: Financial Ratios and Analyses



Using Financial Statements: Financial Ratios and Analyses



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Ratio analysis

- Ratios decode messages built into financial statements and we use them to 'tell the story' or "develop questions'

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Who uses financial ratios?

Stakeholders

- **Short-term suppliers and creditors** are interested in liquidity
- **Long-term creditors** are interested in the company's long-term ability to pay interest and principal.
- **Owners/Common stockholders** are interested in the company's ability to pay dividends and increase the market value of the stock of the company.
- **Managers/CFO/CEO** are assessed based on their performance and ability to manage assets to maximize profit.
  - Consider what specific ratio type best provides this information as we move through the material.

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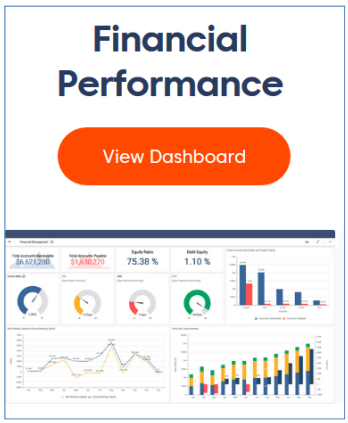
Financial Statement Terminology: Performance

- **Solvency**: firm's ability to meet **all** financial obligation. A>L
- **Liquidity**: firm's ability to meet their **current** financial obligations as they come due
- **Profitability**: firm's ability of a business to produce a return on an investment based on its resources (little different than profit). Answers the question: How many resources are used to earn the profit?
- **Financial flexibility:** firm's ability to react and adapt to financial adversities and opportunities.



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Ratios: note the following:

- Most ratios by themselves are not meaningful - Context and comparability are key
- Many variations of ratio formulas exist. (Use the ones provided.)

- "Ratios" can be expressed in three different ways:
  - 1. Ratio (e.g., current ratio of 2:1)
  - 2. % (e.g., profit margin of 2%)
  - 3. $ (e.g., Earnings Per Share of $2.25)

- Review
  - Comparability
  - Context

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LIQUIDITY RATIOS

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Liquidity Ratios

- Measures a company's ability to pay off its current liabilities with its current assets such as cash, accounts receivable and inventories.
  - Important because this assurance of liquidity support satisfies employees, suppliers & creditors

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Liquidity Ratios

- Measures a company's ability to:
  - Important because this assurance of liquidity support satisfies employees, suppliers & creditors

Current Ratio
= Current Assets (CA)/Current Liabilities (CL)

- Shows the ability of a firm to cover current liabilities
- Historically, firms have aimed to be at or above:

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Liquidity Ratios

CURRENT RATIO

= Current Assets / Current Liabilities

Benchmarks

Green >1 CAN cover all short-term obligations

Yellow = 1 CAN JUST cover short term obligations

Red < 1 CANNOT cover short term obligations

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Liquidity Ratios

- Measures a company's ability to pay off its current liabilities with its current assets such as cash, accounts receivable and inventories.
  - Important because this assurance of liquidity support satisfies employees, suppliers & creditors

Quick Ratio

= (Current Assets- Inventory of Finished Goods) /Current Liabilities

- Shows the ability of a firm to pay debt quickly
- "Quick" assets are Current Assets minus Current inventories.
- Current inventories are excluded from quick assets because it takes time to sell them and get cash

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Liquidity Ratios

QUICK RATIO OR ACID TEST

=(Current Assets – Inventory) / Current Liabilities

Current assets are Cash, Marketable Securities, Accounts Receivable (net) and current Notes Receivable

Benchmarks

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Liquidity Ratios

Interest Coverage Ratio (also referred to as Times Interest Earned)

= Net Income before interest paid / Annual Interest expense

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Liquidity Ratio Examples

- For Engineered Industries:
  - The **current ratio** is above 2: (8,770,000/2,180,000 = 4.02)
  - The **acid-test ratio** is well above 1: (1,940,000 + 950,000 + 4,100,000)/2,180,000 = 3.21

Balance Sheet for Engineered Industries, December 31, 2016 (all amounts in $1,000s)

Assets		Liabilities	
Current assets		Current liabilities	
Cash	1,940	Accounts payable	1,150
Accounts receivable	950	Notes payable	80
Securities	4,100		
Inventories	1,860	Accrued expense	950
(*minus*)Bad debt provision	−80	Total current liabilities	2,180
Total current assets	8,770		
		Long-term liabilities	1,200
		Total liabilities	**3,380**
Fixed assets			
Land	335		
Plant and equipment	6,500		
(*minus*)Accumulated depr.	−2,350		
Total fixed assets	4,485	**Equity**	
		Preferred shares	110
Other assets		Common shares	650
Prepays/deferred charges	140	Capital surplus	930
Intangibles	420	Retained earnings	8,745
Total other assets	560	Total equity	10,435
Total assets	**13,815**	**Total liabilities and equity**	**13,815**

Liquidity Ratio Examples

- For Engineered Industries:
  - The Interest Coverage Ratio is:
    = (1,120,000 – 120,000) / 120,000
    = 8.3)

Income Statement for Engineered Industries for End of Year 2016 (all amounts in $1,000)

Operating revenues and expenses	
Operating revenues	
Sales	18,900
(*minus*) Returns and allowances	−870
Total operating revenues	**18,030**
Operating expenses	
Cost of goods and services sold	
Labour	6,140
Materials	4,640
Indirect cost	2,280
Selling and promotion	930
Depreciation	450
General and administrative	2,160
Lease payments	510
Total operating expense	**17,110**
Total operating income	**920**
Non-operating revenues and expenses	
Rents	20
Interest receipts	300
Interest payments	−120
Total non-operating income	**200**
Net income before taxes	**1,120**
Income taxes	390
Net profit (loss) for Year 2016	**730**

Liquidity management

To increase an operation's liquidity, a manager can:

- Structure short term debts carefully
- Ensure inventory is not building up
- Ensure enough cash is available – not too high or too low

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SOLVENCY RATIOS

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Solvency Ratios

- Relationship between Debt and Equity Financing in the Firm

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Solvency Ratios

- Relationship between Debt and Equity Financing in the Firm

Debt to Equity Ratio (Leverage Ratio)

= Total Liabilities / Owner Equity OR

variations

= (long term debt + short term debt) / Owner Equity

- Uses Balance Sheet, or Net Worth values, or both

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Solvency Ratios

DEBT TO EQUITY RATIO (LEVERAGE RATIO)

- Relationship between Debt and Equity Financing in the Firm.
- Also - Measures the level of **financial risk** – higher ratio translates into higher financial risk

Benchmark:

- creditor perception and impact:

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Solvency Ratios

Equity to Asset (Percent Ownership)

=Owner Equity / Total Asset

Or Net worth / Total Asset

- Uses Balance Sheet, or Net Worth values, or both

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Solvency Ratios

Interest Coverage Ratio = Total Income/Interest Payments

- Indicates how much revenue must drop to affect the firm's ability to finance its debt
- This ratio should be at least 3.0 for industrial firms
- Total income is total revenues minus all expenses except interest payments
- Derived from Income Statement

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Solvency Ratio Examples

- For Engineered Industries:
- Debt-to-Equity Ratio = Total Liabilities / Owner Equity
  = 3,380,000/10,435,000
  = 0.32

Balance Sheet for Engineered Industries, December 31, 2016 (all amounts in $1,000s)

Assets		Liabilities	
Current assets		Current liabilities	
Cash	1,940	Accounts payable	1,150
Accounts receivable	950	Notes payable	80
Securities	4,100		
Inventories	1,860	Accrued expense	950
(*minus*)Bad debt provision	−80	Total current liabilities	2,180
Total current assets	8,770		
		Long-term liabilities	1,200
		Total liabilities	**3,380**
Fixed assets			
Land	335		
Plant and equipment	6,500		
(*minus*)Accumulated depr.	−2,350		
Total fixed assets	4,485	**Equity**	
		Preferred shares	110
Other assets		Common shares	650
Prepays/deferred charges	140	Capital surplus	930
Intangibles	420	Retained earnings	8,745
Total other assets	560	Total equity	10,435
Total assets	**13,815**	**Total liabilities and equity**	**13,815**

Solvency Ratio Examples

- For Engineered Industries:
- Equity-to-Asset Ratio = Owner Equity / Total Assets
  = 10,435,000 / 13,815,000
  = 0.76

Balance Sheet for Engineered Industries, December 31, 2016 (all amounts in $1,000s)

Assets		Liabilities	
Current assets		Current liabilities	
Cash	1,940	Accounts payable	1,150
Accounts receivable	950	Notes payable	80
Securities	4,100		
Inventories	1,860	Accrued expense	950
(*minus*)Bad debt provision	−80	Total current liabilities	2,180
Total current assets	8,770		
		Long-term liabilities	1,200
		Total liabilities	**3,380**
Fixed assets			
Land	335		
Plant and equipment	6,500		
(*minus*)Accumulated depr.	−2,350		
Total fixed assets	4,485	**Equity**	
		Preferred shares	110
Other assets		Common shares	650
Prepays/deferred charges	140	Capital surplus	930
Intangibles	420	Retained earnings	8,745
Total other assets	560	Total equity	10,435
Total assets	**13,815**	**Total liabilities and equity**	**13,815**

Solvency Ratio Examples

- For Engineered Industries:
- Interest Coverage Ratio = Total Income/Interest Payments
  = (18,350,000 − 17,110,000)/120,000 = 10.3

Income Statement for Engineered Industries for End of Year 2016 (all amounts in $1,000)

Operating revenues and expenses	
Operating revenues	
Sales	18,900
(*minus*) Returns and allowances	−870
Total operating revenues	**18,030**
Operating expenses	
Cost of goods and services sold	
Labour	6,140
Materials	4,640
Indirect cost	2,280
Selling and promotion	930
Depreciation	450
General and administrative	2,160
Lease payments	510
Total operating expense	**17,110**
Total operating income	**920**
Non-operating revenues and expenses	
Rents	20
Interest receipts	300
Interest payments	−120
Total non-operating income	**200**
Net income before taxes	**1,120**
Income taxes	390
Net profit (loss) for Year 2016	**730**

Solvency Management

To increase solvency :

- Increase operating profits
  - Increasing prices, quality, volume, or added value to production
  - Increase production efficiencies
- Decrease debt - additional principal payments
- Ensure productive capital expenditures

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PROFITABILITY RATIOS

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Profitability Ratios

- Profitability compares business earnings against all economic resources utilizes to create those earning - human and capital resources.
- Done to allow comparison to other investments – opportunity cost

PROFIT MARGIN
= Net Income /Total Revenue

Return on Equity (ROE)
= Net Income/ Owners' Equity

Return on Assets (ROA)
= (Net Income + annual interest expense) / Average Total Assets

Net Profit Ratio
= Net Profit / Net Sales Revenue

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Profitability Ratios

OPERATING PROFIT MARGIN

- Shows company's ability to turn a dollar of revenue into a dollar of profit after accounting for all the expenses required to run the business.
- Example 25% - earn a $1 and keep 25cents as profit

Benchmark

- Green: Greater than 25 percent
- Yellow: 10 to 25 percent
- Red: Less than 10 percent

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Profitability Ratios

RETURN ON EQUITY (ROE)

= Net Income
Average Owner Equity

You can use Net Worth values, if that is all you have available.

Usually converted to percent value

% return that a shareholder or owner earns on what they invested in the business

Benchmark:

- Use opportunity cost - what else could the investment be earning?
  - Bank rate/Stock market rate

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Profitability Ratios

RETURN ON ASSETS (ROA)

= Net Income + Annual Interest Expenses
Average Total Assets

Or, if you need to adjust for taxable benefit of interest expense then use formula ..

= Net Income + Interest expense (1 – tax rate)
Average Total Assets

- Use average TA if possible; (you can use Net Worth values if that is all that is available)
- Converted to percent usually
- Return (profits) generated for every dollar of assets owned by the business.

Benchmark

- Green: Greater than:
- Yellow: range of:
- Red: Less than:

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Profitability Ratios

Note that for ROE & ROA:

- **numerator** is an amount from an annual net income statement
- **denominator** is a balance sheet amount at one point in time

- Address by using average of two balance sheet amounts for denominator – rolling average
  - **(Value end of current year + Value end of prior year)/2**

    Careful, though, because using the average of only two pts in time can also be misleading if the company's year ends at the low point of business activity.

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Profitability Ratios

- **Net Profit Ratio** = Net profit/Net sales revenue
  - Indicates cost efficiency of operations and firm's ability to convert sales into profits
  - Net sales revenue equals sales minus returns and allowances

Profitability Ratio Examples

- For Engineered Industries:

- Profit Margin
  = Net income / Total revenue
  = 1,120,000/18,030,000
  = 6.2%

Income Statement for Engineered Industries for End of Year 2016 (all amounts in $1,000)

Operating revenues and expenses	
Operating revenues	
Sales	18,900
(*minus*) Returns and allowances	−870
Total operating revenues	**18,030**
Operating expenses	
Cost of goods and services sold	
Labour	6,140
Materials	4,640
Indirect cost	2,280
Selling and promotion	930
Depreciation	450
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Interest payments	−120
Total non-operating income	**200**
Net income before taxes	**1,120**
Income taxes	390
Net profit (loss) for Year 2016	**730**

Profitability Ratio Examples

- For Engineered Industries:

- Return On Equity
  = Net income / Average Owner Equity
  = 1,120,000/10,435,000 = 10.7%

31, 2016 (all amounts in $1,000s)

Liabilities	
Current liabilities	
Accounts payable	1,150
Notes payable	80
Accrued expense	950
Total current liabilities	2,180
Long-term liabilities	1,200
Total liabilities	**3,380**
Equity	
Preferred shares	110
Common shares	650
Capital surplus	930
Retained earnings	8,745
Total equity	10,435
Total liabilities and equity	**13,815**

Income Statement for Engineered Industries for End of Year 2016 (all amounts in $1,000)

Operating revenues and expenses	
Operating revenues	
Sales	18,900
(*minus*) Returns and allowances	−870
Total operating revenues	**18,030**
Operating expenses	
Cost of goods and services sold	
Labour	6,140
Materials	4,640
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Non-operating revenues and expenses	
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Interest receipts	300
Interest payments	−120
Total non-operating income	**200**
Net income before taxes	**1,120**
Income taxes	390
Net profit (loss) for Year 2016	**730**

Profitability Ratio Examples

- For Engineered Industries:
  - Return On Assets
    = (Net income + Annual Interest) / Total Assets
    = (1,120,000 + 120,000)/13,815,000 = 9.0%

Balance Sheet for Engineered Industries, Decemb

Assets	
Current assets	
Cash	1,940
Accounts receivable	950
Securities	4,100
Inventories	1,860
(*minus*)Bad debt provision	−80
Total current assets	8,770
Fixed assets	
Land	335
Plant and equipment	6,500
(*minus*)Accumulated depr.	−2,350
Total fixed assets	4,485
Other assets	
Prepays/deferred charges	140
Intangibles	420
Total other assets	560
Total assets	**13,815**

Income Statement for Engineered Industries for End of Year 2016 (all amounts in $1,000)

Operating revenues and expenses	
Operating revenues	
Sales	18,900
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Operating expenses	
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Total operating expense	**17,110**
Total operating income	**920**
Non-operating revenues and expenses	
Rents	20
Interest receipts	300
Interest payments	−120
Total non-operating income	**200**
Net income before taxes	**1,120**
Income taxes	390
Net profit (loss) for Year 2016	**730**

Profitability Ratio Examples

- For Engineered Industries:
  - Net Profit Ratio = Net profit/Net sales revenue
    = 730,000/18,030,000 = 0.040 = 4.0%

Income Statement for Engineered Industries for End of Year 2016 (all amounts in $1,000)

Operating revenues and expenses	
Operating revenues	
Sales	18,900
(*minus*) Returns and allowances	−870
Total operating revenues	**18,030**
Operating expenses	
Cost of goods and services sold	
Labour	6,140
Materials	4,640
Indirect cost	2,280
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Interest receipts	300
Interest payments	−120
Total non-operating income	**200**
Net income before taxes	**1,120**
Income taxes	390
Net profit (loss) for Year 2016	**730**

Profitability Management

- Strategies to increase profitability include:
  - Reduce unproductive capital or human assets
  - Reduce costs (especially in the operation's largest expenses)
  - Improve revenue through increased volume or quality of production
  - Take advantage of cash discounts from suppliers

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FINANCIAL RATIOS AND ANALYSES

Comparability of Financial Ratios

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Comparability of Financial Ratios

- **Comparability**
  - Analysis of a company's financial information typically follows a three-pronged approach
  - **Compare over time** - Trends within a company's using own financial information are analyzed
  - **Compare between competing firms** - Financial measures are compared between competitors.
  - **Compare to Industry Averages**
  - Encourages objective measure

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Differentiating between Ratio Computations and Ratio Analysis

- **Context**–
  1. **Understand the business. - firm factor.**
     - beyond finance - management, marketing, production/operations, and R&D decisions
  2. **Understand the nature & drivers of the industry in which the organisation works. - industry factor.**
     - Trends, supply, demand, supplier, innovation, legal, regulation
  3. **Understand the competition - other firms factor**
     - **Competition** level, increasing, decisions, expansion, critical success factors, niche, growth
  4. **Understand that the overall state of the economy - economic factors.**
     - economic, social, cultural, demographics, environmental, political, governmental, legal, and technological trends

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FINANCIAL RATIOS AND ANALYSES

Financial Statements Analyses Examples

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Statement Analysis – B/S & Net Worth

- Match Assets with Liability for each category
- Distribution of debt with term categories
  - Ex: increase of short term debt, high level of medium term debt over time
- Distribution of assets with term categories and over time
- Anything unusual or of concern?

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Statement Analysis – B/S & Net Worth - example

Extra Salty Snacks
Balance Sheet Statement
At January 1, 20XX

Current Assets	0		Current Liabilities	20,000
Intermediate Assets	100,000		Intermediate Liabilities	0
Long Term Assets	50,000		Long Term Liabilities	100,000
			Owner Equity	30,000

Net Worth Statement
At January 1, 20XX

Current Assets	100,000		Current Liabilities	20,000
Intermediate Assets	50,000		Intermediate Liabilities	0
Long Term Assets	0		Long Term Liabilities	100,000
			Net Worth	30,000

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Statement Analysis – B/S & Net Worth - example

No-Salt Snacks
Balance Sheet Statement
At January 1, 20XX

Current Assets	20,000		Current Liabilities	75,000
Intermediate Assets	80,000		Intermediate Liabilities	0
Long Term Assets	50,000		Long Term Liabilities	25,000
			Owner Equity	50,000

Net Worth Statement
At January 1, 20XX

Current Assets	20,000		Current Liabilities	75,000
Intermediate Assets	80,000		Intermediate Liabilities	0
Long Term Assets	500,000		Long Term Liabilities	25,000
			Net Worth	500,000

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Statement Analysis - Income Statement

- Look at revenue (production, quality, price, product)
- Look at expenses (fixed versus variable) and specific items
- Net Income level over time and relative to total revenue & total cost
- Does any item stand out?

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Statement Analysis – B/S and Income Statement - example

Extra Salty Snacks
Income Statement
January 1 to December 31, 20XX

Revenue	500,000
Variable expenses	300,000
Fixed expenses	100,000
Net Income	100,000
Taxes	15,000
Profit	85,000

No-Salt Snacks
Income Statement
January 1 to December 31, 20XX

Revenue	500,000
Variable expenses	400,000
Fixed expenses	40,000
Net Income	60,000
Taxes	9,000
Profit	51,000

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Statement Analysis – B/S & Income Statement - example

- Which firm is in a better position to manage next year? Why?
- Calculate some of the ratios we've discussed for each firm
- What do the ratios tell us about the two firms' situations?

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Statement Analysis Example 2

- Many stories exist that aren't in the statements
- TD Annual Report example

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FINANCIAL RISK AND BUSINESS RISK

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Financial Risk and Business Risk

BUSINESS RISK: Risk of Net Income variation (and potential losses) due to price and quantity changes

- Present in all businesses

- **Measured**: Assess impact of business risk via
  - **Break-even analysis** define the unit required to cover all costs
  - **What if Scenario analysis** allows us to look at the impact of key price or quantity values on net income
  - How can we review if business risk (P and Q changes) is likely to occur?
    - Industry and Competitive Analysis
- **Source**: External to business
- **Strategies**: Mitigate but never eliminate

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Financial Risk and Business Risk

FINANCIAL RISK: Risk due to fixed debt obligations. Too much debt means creditors / suppliers / bankers / investors have concerns over ability to pay

- **Measured**: review by:
  - **Debt to Equity Ratio** : high versus low or even trend to increase/decrease.
  - **Profit levels**: If you have lots of net income then maybe lots of debt payment can be OK
- **Source**: Debt and thus fixed debt obligations
- **Strategies**: Mitigate by? Eliminate by?

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